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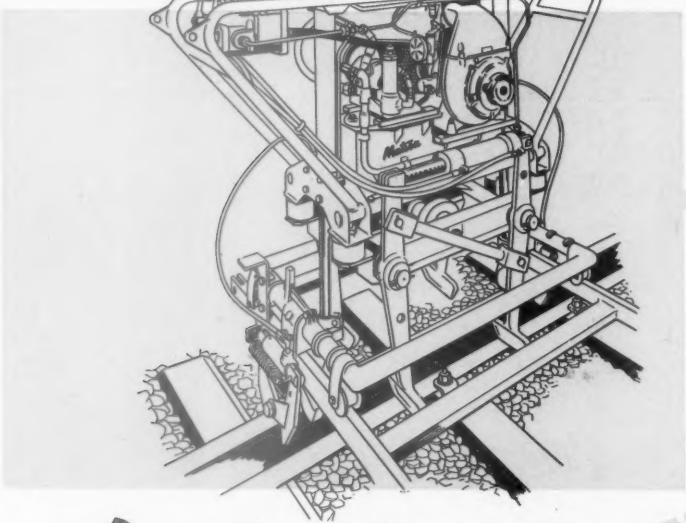

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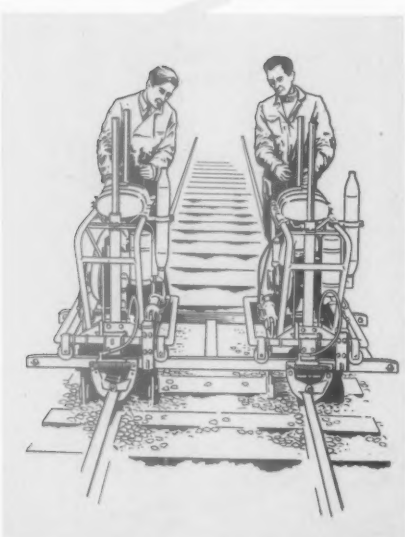

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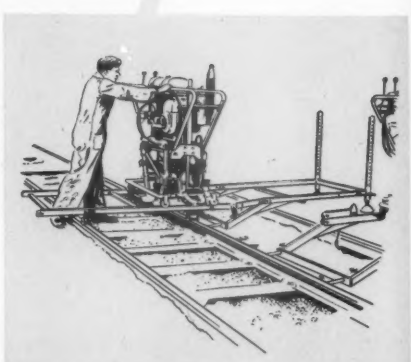

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Using Diesels to Advantage

THE first of the prototype main-line diesel locomotives ordered by British Railways at the end of 1955 as part of the modernisation plan has already been delivered; this is a 1,000-b.h.p. English Electric-Vulcan Bo-Bo mixed-traffic unit which has gone into service in the London Midland Region after its appearance at the recent Battersea exhibition. In the near future, the larger units in the 2,000-b.h.p. range may be expected to make an appearance on some main lines, probably working existing trains to their present schedules. Although the performance of the locomotives on the track is a factor which must be taken into account, and although the numbers ordered in November, 1955, and shortly afterwards, will suffice for little more than some top-link and fast freight workings, it is clear that new schedules taking into account diesel characteristics should now be being planned, as doubtless they are, by the motive power and operating departments. It has been shown in other countries that diesels must be given long runs and worked intensively if they are to pay for their high initial cost, and in Great Britain, with its comparatively short distances, the preparation of schedules will call for ingenuity and, in most cases, a complete disregard of former steam working. The capacity of the diesel to operate for long hours with little attention, and thus to permit a more intensive service to be worked, has been well demonstrated by the diesel multiple units, of which perhaps 1,000 will be in use by the end of this year and upwards of 2,000 by the end of 1958. It will be some time before the first of the high-speed luxury diesel multiple-unit trains are in service; but recent summer and winter timetables show, with each issue, how passenger services are gradually being re-shaped to get the utmost use from the existing sets. Their popularity with the public is shown by the swiftly-rising receipts wherever they are introduced—which are still growing, demonstrating that even though the novelty of the trains may have been one reason for the rise in passenger traffic, good service and cleanliness have ensured its retention.

Fifty-Cycle Traction in India

THE decision of the Government of India has been announced in favour of the 50-cycle, single-phase system at 25 kV. for main-line electrification, and orders for locomotives are stated to have been placed a few days ago with a group of manufacturers of electrical equipment in Belgium, France, Germany, and Switzerland. Evidently the Indian Railway Board has been impressed by the performance of the extensive 50-cycle electrifications of the French National Railways. Besides the Grand Chord line of the Eastern Railway, and South Eastern Railway lines in the Bengal-Bihar industrial area, conversion at 25 kV. is now approved of sections in the Bombay and Madras areas—beyond, presumably, the lines already electrified in and around those cities. For projects of such magnitude, involving new techniques of which the Indian railways have as yet had no experience, technical assistance was essential. After taking advice from the consulting engineers in many countries, it was decided to ask the S.N.C.F. to provide technical aid.

French Technical Aid for Indian Electrification

THE French National Railways will have, for this purpose, the assistance of the French company Sofrerail, in the formation of which they participated; its chairman is stated to be Monsieur Armand Porchez, Assistant Director General of the S.N.C.F., and its aim the fostering of the use of French railway techniques in other countries. The agreement between the Indian and French railways provides for co-operation, which includes planning of projects, drawing up of specifications, negotiations with and choice of contractors, and the supervision of works. The S.N.C.F. also undertakes to train Indian staff in its engineering departments and on its own electrified lines in France, and to keep its own staff and that of Sofrerail in India for a year after the electrification of each section of line is completed, to ensure that the equipment is working satisfactorily, and that maintenance is properly organised. The French Government is reported to have played an active part in bringing about this arrangement, so advantageous for the French railway industries. It may perhaps be asked how, with electrification at 50 cycles proceeding apace in France, S.N.C.F. staff can be spared for the Indian projects.

Railway Projects in Syria

AFTER a number of conflicting reports, it is now known that an economic agreement has been reached between the U.S.S.R. and Syria under which loans will be granted to Syria to help with the construction of railways, roads, power plants, and so on. The U.S.S.R. is believed to have agreed in principle to assisting with the enlargement of the port of Latakia and building a railway from it to connect with the 4-ft. 8½-in. gauge Baghdad line, presumably at a point between Hama and Aleppo. It is proposed also to continue the Aleppo-Homs line southwards within the Syrian border to Damascus, which can now be reached only by passing through the Lebanon and changing at Rayak to a 3-ft. 5½-in. line for the final portion of the journey. Apart from these two new lines,

it is proposed to convert the narrower-gauge lines to standard gauge. The cost of the Latakia railway project alone is estimated at S.£550 million. The value of the loan to Syria will be some £40 million, repayable in 10 years, and probably at 2½ per cent interest. A mission from the U.S.S.R. will survey all projected works and at least assist in their planning. Railway material is likely to come from Russia and be paid for by exchange exports of wheat, cotton, and barley from Syria. It is understood, however, that the Syrian authorities have recently been making enquiries as to the supply of railway equipment from Britain.

Overseas Railway Traffics

SOUTH African Railways & Harbours railway receipts were £2,778,973 for the week ended June 22, 1957, compared with £2,576,420 in the corresponding week of 1956. Receipts in general continued to rise above the 1956 figures in the following weeks, and at July 20, aggregate receipts from April 1 were £43,581,682, compared with £41,731,341 in the corresponding period last year. Harbours and Airways receipts also showed a considerable improvement on the previous year's figures, with Airways aggregate receipts from April 1 some 50 per cent better than in the corresponding period of 1956. Rhodesia Railways revenue during the month of April, 1957, amounted to £2,476,933, compared with £2,081,395 during the same month last year, but expenditure also increased from £1,733,330 to £1,872,385. The latest figures received from the Midland Railway Company of Western Australia Limited show that estimated road and railway receipts for May were £A82,442 (against £A75,671 for May, 1956).

Strengthening Links with Northern Ireland

PLANS for improved port and shipping facilities between Britain and Northern Ireland were outlined last week by Sir Brian Robertson, Chairman of the British Transport Commission, in an address to industrial leaders in Belfast. A new motor ship is under construction for conveying livestock and cargo, with the intention of providing a daily livestock service, between Heysham and Belfast, and, meanwhile, every endeavour will continue to be made to deal with the increasing livestock business, which plays such a vital part in the economy of Northern Ireland. Another new ship, for the Larne/Stranraer route, is being designed for ramp working at the two port terminals to convey passengers, cargo, and livestock. Some reconstruction at Stranraer is envisaged, while improvements to Heysham equipment will enable two new container vessels now being constructed to be turned round quickly. More freight, parcels, livestock, cars and mails, Sir Brian Robertson stated, were being carried by the railway-owned ships between Britain and Ireland, and the container services were gaining in popularity. The number of passengers conveyed on the three new ships between Heysham and Belfast had increased by 13 per cent up to the end of July, compared with the same period last year. To improve the Larne-Stranraer service, two-berth second class sleeping cars are to replace the four-berth cars between Euston and Stranraer.

Linking North and South China

THE bridge over the Yang-tse at Hankow was reported a few days ago as finished sufficiently to allow a train to cross, so in effect completing the long-planned 4-ft. 8½-in. rail link between Peking and Canton; and the ceremonial opening of this rail-and-road bridge will take place shortly. A Yang-tse bridge at this point was planned some years ago, but there has always been the difficulty of the difference in water level between winter and summer, in which latter time of year the river is swollen with the melted snows of Tibet—the same problem as is met in India in projects to bridge the Brahmaputra —which is deepened at the same season and indeed from almost the same sources. The new bridge, which replaces a ferry, and is the only bridge over the Yang-tse, was begun by the present regime in 1955. It is over a mile long; all the steel used is understood to have been made in China.

Vernacular Press Advertising in East Africa

THE growth of literacy in some Asian and African countries is helping the railways there to guide and inform passengers. Press advertising has for some time been practised in India, for instance. East African Railways & Harbours have launched a new campaign with advertisements appearing in the most widely read papers in one of three languages, Swahili, Luganda, or Luo, according to the language spoken by the majority in the area. The campaign has been planned so that, over a period of about nine months, five subjects will be featured showing third class passengers how they can get the best out of the railway services available. The advertisements, which are illustrated, are presented by "Mwalimu" ("teacher") who, from experience, is in a position to give good advice, such as: "Before you go on to the train buy your ticket at the booking office. If you do not you will have to pay more for a ticket on the train," or "It is safer riding inside the carriage than on the steps." Coloured posters are also being produced.

New York Central Progress

THE far-reaching improvement schemes initiated on the New York Central System during the last few years under the leadership of its President, Mr. Alfred E. Perlman, have been mentioned in this journal from time to time. A summary of the large-scale programmes, some now completed, as the great Frontier Yard at Buffalo, and the installation of C.T.C. on the Buffalo-Cleveland section, until recently four-track, was explained at the company's annual meeting held at Albany, an account of which has recently been received. More than 700 shareowners attended the meeting, which lasted over 4 hr.; some 89 per cent of the company's outstanding stock was represented. An unusual feature was a "tour" of some of the major physical achievements of the year presented in the meeting hall by means of closed-circuit television originating in Cleveland. Special trains were arranged between New York City and Albany for shareowners attending the meeting. A problem which received close attention was the heavy burden of State taxation from which competing transport is comparatively free.

Flexible Bridge Piers

THE new 1,156-ft. bridge completed on March 15, 1957, over the Orange River near Bethulie, between Bloemfontein and Queenstown on the South African Railways main line to East London, consists of 16 68-ft. R.C. deck spans cast *in situ* and the average height of rail level above river bed is 50 ft. The concrete piers and abutments are founded upon rock, the latter through the medium of concrete piles. The most noteworthy features of this structure, however, are that the top 15 ft. of every second pier was cast in two halves with a 1-in. vertical gap between them. This allows for slight flexibility permitting of expansion and contraction in the concrete spans bearing on the pier-tops. Also that a dam or curtain wall was built up from rock between all the piers to impound the river water at very low-flow periods. In one span near the north bank the top of the wall is 3 ft. lower than throughout the remainder, thus forming "a notch" and ensuring that sufficient water reaches the adjacent pump-suctions of a neighbouring locomotive watering station supply plant, even when the river bed appears to be dry.

Mechanical Frames on London Transport Lines

THERE still remain a few mechanical lever frames along the routes forming the original inner London underground system, a legacy from the days when manual

signalling was in service or where, as on the Great Northern & City line, which had automatic signalling, the terminal stations were fitted with such frames. The old City & South London and Central London tubes and, of course, the District and Metropolitan lines had them at every station, but most were abolished when power and automatic signalling was adopted on electrification and, later, on those tubes themselves. Those finally retained became gradually replaced by more modern equipment, as opportunity offered or circumstances required. The 30-lever frame installed at South Harrow for the completion of the Ealing & Harrow Railway in 1901—a line never opened to the public, however, with steam traction —is about to be replaced by remote control, while those at Bank (Central Line), dating from 1900, and Angel (Northern Line), provided in 1901, also are scheduled to disappear. All three came from the long defunct firm of Evans O'Donnell & Company, of Chippenham.

A Fractured Rail End

IN his report on the derailment, unattended by any casualty, between Brookwood and Farnborough on November 22, 1956, a summary of which appears in this issue, Colonel W. P. Reed makes no recommendation but dwells on certain features of the case, both operating and technical. The motorman and guard believed the brake application to have been caused by the pulling of the communication chain and did not observe the rule regarding looking at once to see whether the adjacent line had become obstructed. When it was seen to be the guard acted promptly and his hand signal was seen, in the impaired visibility obtaining, at maximum distance by the alert driver of the oncoming express, who brought his speed down very rapidly but could not stop in time. The derailed vehicle was just foul and was grazed by the express with no serious consequences. A piece of rail had become detached, following the spread of some flaws. The report comments on the relevant circumstances and details the steps being taken to reduce the incidence of rail breakages, to which very few accidents are to be attributed.

Southern Region Winter Timetables

A NOTABLE feature of the Southern Region winter service, which comes into operation on September 16, is the new express from Waterloo at 7 p.m. to Salisbury (non-stop in 85 min. for the 83·7 miles), Yeovil Junction, Axminster, and Exeter, where it will take over the through working to Plymouth previously operated by the 6 p.m. from Waterloo. The latter will terminate at Exeter, and the former, reaching Exeter Central at 10.18 p.m., will continue 14 min. later than the previous 6 p.m. down, an acceleration of 46 min. from London to Exeter and beyond. A balancing up express is to leave Exeter at 6.30 a.m.—a facility 60 min. earlier than any previously given—for Axminster, Yeovil Junction, Sherborne, Gillingham, Salisbury, Basingstoke and Waterloo, reached at 10.8 a.m. The restaurant cars previously run on the 5 p.m. from Waterloo to Yeovil Junction will be transferred to the 7 p.m., but the attractiveness of the new 6.30 a.m. from Exeter will be weakened by its having no refreshment facilities. The 7.5 a.m. from Yeovil Junction to Waterloo will terminate at Salisbury (where it will connect with the new 6.30 a.m. from Exeter), and a new 7.50 a.m. from Salisbury, calling at Andover, Whitchurch and Basingstoke, will reach Waterloo at 9.42 a.m.

On the Bournemouth line all the 2-hr. Waterloo-Bournemouth Central schedules introduced with the summer timetable will be continued (calling at Southampton Central in each direction), at 8.20 and 10.30 a.m. and 6.30 p.m. down, and at 12.40, 2.40, 6.40, and 7.40 p.m. up. The 8.20 a.m. down and the 7.40 p.m. up (7.28 p.m. from Bournemouth West) have never run before in the winter; the former carries a restaurant car daily, but the latter on Saturdays only. The 7.30 p.m. from Waterloo to Winchester, Southampton, Christchurch and Bournemouth on Sundays, and the corresponding 7.25 p.m. from Bournemouth to Southampton and Waterloo only, also are being continued for the winter.

In the Eastern Section the 5 p.m. from Cannon Street to Folkestone, Dover, Deal, and Ramsgate will start at 4.56 p.m. and call additionally at Tonbridge. Other alterations in the summer timetables, brought about by the introduction of the hourly diesel service between London and Hastings, will continue for the winter, including the starting of the fast Charing Cross to Dover and Deal trains at 8 instead of 15 min. past the hr. (except the afternoon down "Man of Kent," which leaves Charing Cross at 4.10 p.m.). The 4.45, 5.15, 5.45, and 6.15 p.m. expresses from Cannon Street to the Kent Coast will all start 1 min. earlier; and there are some slightly earlier starts to several of the up trains from Ramsgate, in most cases with a minute or two of deceleration. The 3.35 p.m. from Victoria to Ramsgate will carry a buffet car. Incidentally, a useful feature of the new Southern timetable is the distinction drawn between restaurant and buffet services; all the cars in Eastern Section trains are now in the latter category.

The most important alterations in the Southern timetable for the winter, however, are those resulting from the introduction of a network of services with multiple-unit diesel trains in the Portsmouth-Southampton-Winchester-Alton-Andover-Salisbury area, running on an hourly even-interval basis. There will be, first, a semi-fast service from Portsmouth at 3 min. past each hr., calling at Fratton, Cosham, Fareham, Netley, Woolston, St. Denys, Southampton Central, Romsey, Dunbridge and Dean to Salisbury, from 6.3 a.m. to 8.3 p.m. inclusive, taking 84 min. as compared with the previous 105 min. with steam; return workings from Salisbury will be at 42 min. past each hr. from 7.42 a.m. onwards, with slight adjustments at certain hours to fit in with other services.

There will, next, be a stopping service from Portsmouth to Andover at 53 min. past each hr., via Fareham, Eastleigh, and Romsey; until November 3, steam trains will be used for these workings, on slightly slower timings, until enough diesel units become available. Return workings from Andover in general will be at 42 min. past each hr. The overall time of 96 min. compares with a best time of 2¼ to 2½ hr. by steam last winter, when there were scarcely any through trains, and, between Romsey and Andover, gaps at certain times of the day of between 3 and 4 hr. in the service.

Also beginning on November 4, an hourly stopping service will run from Alton, in connection with the electric trains from Waterloo, to Winchester and Southampton Terminus, starting at 53 min. past each hr.; as compared with nine trains each way daily in the present timetable, in all cases but one running to and from Eastleigh only, there will be 18 to and from Southampton and one to and from Eastleigh, taking 54 min. for the down run and 56 to 61 min. for the up, as compared with 74-86 min. with steam. This will be supplemented by an hourly stopping service between Southampton Terminus and Winchester only, starting northbound at 25 min. past the hr., and southbound at 55 min. past, and taking 24 min. as compared with 35 min. with steam. There will thus be half-hourly stopping trains over this stretch.

Finally there will be an hourly stopping service between Portsmouth, Fareham, Netley and Southampton Central, leaving Portsmouth at 38 min. past each hr., and returning at 57 min. past each hr.; this will be a 54-56 min. run, as compared with an average of 70 min. with the previous steam trains. Similar services to the two just described, but on slower timings, will be provided with steam from the introduction of the new timetable until November 3, when sufficient diesel units for their maintenance will have become available. All the hourly services mentioned will run also on Sundays, except the local service between Winchester and Southampton Terminus.

These frequent, regular, and comparatively fast services should do much not only to rejuvenate passenger traffic in a fairly highly-populated area, but also to create a new travelling public.

Centenary of the Argentine Railways

ON August 30, 1857, the first steam train to run in the Argentine Republic, conveying the President and his ministers in coaches, numerous lesser functionaries in wagons, and with a crowd of the general public on horseback, left the city of Buenos Aires for the six-mile run to the little flower-growing suburb of Floresta. This was the beginning of the present network of over 27,000 miles, a very large proportion of which was of British construction and management. This pioneer line, of 5 ft. 6 in. gauge—although built and equipped by Argentine capital—was due to the initiative and persistence of an English engineer, Allen, whose efforts resulted in the railway being not only built but equipped with locomotives and rolling stock purchased at bargain prices in Britain.

The generally accepted explanation of the 5 ft. 6 in. gauge is that the first two locomotives and rolling stock were brought second-hand from the Crimean Balaklava Railway, but recent research makes this explanation untenable. It is more probable that the 5 ft. 6 in. gauge was deliberately chosen, possibly to some extent through sentimental ties with Spain, but more likely from far-sighted policy, as the neighbouring republic of Chile already had this gauge, while the up-river republic of Paraguay had made the same decision.

The original line became bankrupt in 1863 and was taken over by the Government of the Province of Buenos Aires. Very considerable extensions were made up to 1890, when the financial crisis of that year caused the Provincial Government to sell the railway. The greater portion becoming the British-owned Buenos Ayres Western Railway. (The British-owned companies invariably used the spelling Ayres.) British capital became interested in the Argentine Railways in 1863, when the Buenos Ayres Northern Railway was built. This was quickly followed by many others. The Cordoba Central Buenos Ayres Extension Railway opened between 1907 and 1912 completes the list of British Argentine railways built as such, but other lines, such as the Entre Rios, were acquired by purchase. The British-owned and largely British-managed lines obtained their equipment from the United Kingdom, so setting a high standard of workmanship and reliability in very kind of article.

France was the only country other than Britain to invest in Argentine railways; the French-built lines were the metre-gauge Santa Fé and Compania Generál and the broad-gauge Rosario and Puerto Belgrano. Except for the Santa Fé—originally a British-worked provincial railway—these were all opened between 1908 and 1910. The Argentine National Government embarked on railway enterprises in 1873, when it built the broad-gauge Andino Railway. In the case of the metre-gauge lines, renamed the Central Northern, these were extended to the north and west, eventually connecting with Chile and Bolivia, and, by the purchase of the Cordoba Central Railway in 1939, establishing a through route from Buenos Ayres to those countries.

At the time of the sale of the foreign-owned railways in 1948, amalgamations had reduced the British-owned group to the broad-gauge "Big Four": the Buenos Ayres Great Southern, Buenos Ayres Western, Central Argentine, and Buenos Ayres & Pacific Railways; the 4-ft. 8½-in. gauge Entre Rios and North Eastern Railways; and the metre-gauge Transandine and Midland lines, the latter worked and owned by the B.A.G.S. and B.A.W. and the former by the Central Northern Railway. French interests were represented by the broad-gauge Rosario and Puerto Belgrano and the metre-gauge Santa Fé and Compañia Generál lines, the rest of the metre-gauge railways being owned by the Central Northern. The province of Buenos Ayres owned a group of highly competitive lines from La Plata to the Pampa, Olavania, and Azal, while an Argentine company worked the 4-ft. 8½-in. gauge Buenos Ayres Central Railway and the Argentine Government owned a line of the same gauge in Entre Rios and Corrientes known as the Eastern State Railway. A broad-gauge State line connected the B.A.G.S. at Patagones with Barriloche and there were groups of isolated 5-ft. 6-in. and 75-cm. gauge railways in Patagonia.

On the completion of the purchase of the foreign and Argentine company railways and of the provincial State lines, an immediate reorganisation was effected, where possible on regional lines, which resulted in the formation of four main 5-ft. 6-in. gauge regional railways—the General Bartolomé Mitré (formerly C.A.R.), the Domingo Faustino Sarmiento (formerly B.A.W.), the General Roca (former B.A.G.S.), and the General San Martin (former B.A.P.), with an isolated group of this gauge with 75-cm. gauge feeder lines in Patagonia. The 4-ft. 8½-in. gauge lines were amalgamated and included all railways in the provinces of Entre Rios and Corrientes, with the ferry-connected former Buenos Ayres Central Railway, while all metre-gauge lines are grouped as the General Belgrano Railway. By now these regions are settling down to normal working; but there is still a great deal of interconnecting of lines within each group to be done; on the metre gauge there is not only the anomaly of narrow-gauge lines competing in broad-gauge territory, but also the problem arising from the use of the Westinghouse brake on former Central Northern stock and vacuum brake on the rest.

The general picture of Argentine Railways today is not rosy. At the time of the purchase, maintenance was very seriously in arrears and the situation did not improve between 1948 and 1955. With a lessened output of repaired stock, caused by lack of spares and by trade union demands for higher wages, and with a steady increase in main-line traffic and an enormous increase in suburban passenger traffic, due to the concentration of most new industries around the City of Buenos Ayres, it seems that drastic measures will have to be taken to prevent a complete, if gradual, strangulation. The Provisional Government is making great efforts to meet the situation and especially to ensure successful movement of this year's harvest. Large numbers of diesel-electric locomotives are on order, to be delivered in 1957 and 1958, and a commission is at present in Great Britain to effect the purchase of spares for the large number of steam locomotives.

The Provisional Government, however, in view of elections next year, is not in a position to commit itself to any long-term policy. Both political parties appear to be in favour of continuance of State ownership. Even should this be modified, the question of leasing the railways in their present condition and with a daily deficit in the neighbourhood of $3 000,000 (Argentine) a day, would be a major problem. With the necessity of importing a large proportion of fuel and with the chronic shortage of electric power, a comprehensive electrification programme seems difficult of achievement. It is a saving feature that both capital works and rolling stock were built to a high standard, as with hard work and the undoubted ingenuity of the Argentine engineers, much makeshift work can be done in the meantime. The railways are the life-blood of Argentina, and incipient hardening of the arteries must be checked, and quickly. Meanwhile, British industry is prepared to renew its associations with what was once one of the most efficient systems of railways in the world.

Ninth Pan American Railway Congress

THE ninth Congress of the Pan American Railway Congress Association opens in Buenos Ayres on August 30 and closes on September 13. The decision, appropriately enough, to form the Association was taken 50 years ago in connection with a railway exhibition held in Buenos Ayres in 1907 to celebrate the 50th anniversary of the first railway in Argentina, and an exhibition is to be arranged in connection with this year's Congress. The first meeting, then known as the South American Railway Congress, was held in Buenos Ayres in October, 1910. The next meeting did not take place for another 12 years.

when the venue was Rio de Janeiro. The third and fourth were held in Santiago and Bogotá, in 1929 and 1941 respectively. In view of the very considerable part played by British capital, technical skill, and workmanship in developing the railways of South America—which were very largely British-owned at the times of these earlier congresses, the proceedings were of great interest to many in this country. At the 1941 Congress it was decided to change the name to the "Pan American Railway Congress Association" and the countries of North and Central America were invited to become members. At the fifth, held in Montevideo in 1946, representatives of 17 countries were present. The sixth Congress was at Havana in April, 1948, and two months later the U.S.A., which had sent observers to other Congresses, became a Government member. The next Congress was held in Central America, in Mexico City in 1950, and the eighth, in 1953, moved further north to Washington, D.C., and Atlantic City, New Jersey. All of the 21 American republics are now members.

The executive committee, of which the President is Ing. Lucio A. Hasperué, General Manager of the General San Martin Railway of Argentina, met on December 28 last and consists, besides the President, of Messrs. Héctor Montes, Manuel P. Bertolotti, Ricardo Sánchez, Joaquin Nuñery Brian, Enrique Roig, and the Secretary-General of the organising committee, Don José A. Fontanelli, who acts also as secretary of the executive committee. There are sub-committees for Finance; Papers; Reception, Railway Transportation, and Entertainment; Educational Relations and Publicity. In accordance with the practice at former Congresses, the President of the sub-committee for Reception, Railway Transportation, and Entertainment, Capitán Fausto J. Menica, is assisted by three Vice-Presidents, each of whom takes responsibility for one of the three aspects of the work of the sub-committee.

As with previous Congresses, there are reporters for each of five sections of the Congress: Way & Works, Rolling Stock & Traction; Operating; Accountancy, Statistics, Tariffs, Co-ordination & Administration; and Legislation, Staff & General Matters, an arrangement somewhat similar to that adopted by the International Railway Congress Association, whose seventeenth congress is due to be held in Madrid next year. Most of the papers are being translated into English or Spanish as necessary. The preliminary and opening sessions will take place on August 30, when the President of Argentina, General Pedro Eugenio Aramburu, will welcome delegates. The associated railway exhibition, in which all Argentine firms connected with the railway industry and several foreign builders and suppliers are participating, will open on August 31. The five sections will meet separately on September 2 to 5 and September 7 and 10. Official functions include receptions by the Minister of Transport, Rear-Admiral Sadi E. Bonnet, in the evening of September 2, by the U.S.A. official delegation, and by the President of the Congress Association, Ing. Eduardo M. Huergo. Plenary sessions will be held on September 10 to 13 and the formal closing session is on September 13.

No less than 231 papers are being submitted, including 119 from Argentina, 49 from the U.S.A., 28 from Mexico, seven from France, and two from Great Britain. Between them, the papers cover almost every aspect of railway operating, engineering, and management. The French papers include one on economic comparisons between different systems of electric traction by Monsieur M. Garreau, Chef de la Division des Etudes de Traction Electrique, French National Railways, and one on modernising steam locomotives by Monsieur André Chapelon, Ingénieur en Chef Honoraire, S.N.C.F. The two British papers are by Mr. J. Campbell, of the North British Locomotive Co. Ltd., on the haulage capacity of diesel traction, and by Mr. C. E. R. Sherrington, Director, Research Information Division, British Transport Commission, on the relationship between railways and civil air services. Railways in some Central and South American countries are developing fast—in the matter, for instance, of electrification, for which British industry has already supplied a good deal of equipment to South America in recent years—apart from other fields of railway activity. As an indication of policies to be pursued, and of the views held by railway officers in the countries concerned, on technical developments, the proceedings of the Congress must be of great interest to British manufacturers of railway material.

Canadian Pacific Railway

THE report for 1956 of the Canadian Pacific Railway, of which Mr. W. A. Mather is Chairman and Mr. N. R. Crump President, is the 76th on the operations of the company. The volume of freight service performed, measured in ton-miles, increased for the third successive year and exceeded the 1955 volume by 18 per cent. An improvement in grain exports resulted in a substantial increase in the movement of grain and grain products. Railway revenue was 13 per cent higher than in 1955 and 7 per cent above 1953, the previous record year. Costs, however, increased substantially and as a consequence the improvement in net earnings was not as great as might have been expected. The return earned on railway net investment was only 3·15 per cent.

Some of the principal results are compared below with those of 1955:—

	1955	1956
	$	$
Passenger revenue	37,475,825	37,825,191
Freight revenue	368,948,264	423,754,140
Gross revenue	448,598,491	505,262,393
Working expenses	411,271,773	463,926,566
Net earnings	37,326,718	41,335,827
Other income	22,894,567	30,034,463
Fixed charges	16,188,820	15,752,302
Net income	44,032,465	55,617,988
Dividends	23,928,240	27,458,833
Balance	20,104,225	28,159,155

In conformity with the new classification of accounts, railway results now include those of leased electric lines, formerly accounted for through other income, but no longer include the results of Great Lakes steamships, which are now accounted for in other income. The net effect of these changes on 1956 results was a transfer from railway to other income of net earnings amounting to less than $100,000.

An agreement was concluded with the unions representing the non-operating employees on the basis of the report of the Conciliation Board to which the dispute had been referred at the beginning of the year. The agreement, covering a two-year period from January 1, 1956, provided for wage increases amounting in total to 11 per cent, comprising 3 per cent effective January 1, 1956, 3 per cent April 1, 1956, 2 per cent November 1, 1956, and 3 per cent June 1, 1957, and provided for payment for two statutory holidays in addition to the five previously established, and health and welfare benefits to cost $8.50 per employee per month, half to be paid by the company and half by the employee.

The programme of conversion to diesel traction for the improvement of efficiency of railway operations was carried forward by the acquisition of 113 new diesel units, comprised of 99 main line shunters, for freight and passenger service, and 14 yard shunters. A second stage of the diesel maintenance shops in Montreal, the first stage of which was built in 1955, was completed during the year. Also placed in service were 3,952 freight wagons including 3,200 covered wagons. A new carriage repair shop was completed at Winnipeg.

Six new "Dayliner" services were commenced, including the international service between Montreal and Boston, bringing the distance these trains were in operation up to 3,000 route miles.

New track constructed included 21·4 miles from Brocket to Drywood in Alberta to serve a new industrial development at the latter point. During the year 789 manufacturing, warehousing, and distributing establishments were located in the vicinity of the railway and, to serve 190 of these, 53 miles of track were constructed.

Legislation was obtained from the Parliament of

Canada and from Provincial Legislature vesting in the C.P.R. the railways, undertakings, and properties of 11 of the 13 wholly-owned leased railway companies which were referred to in the 1955 annual report. The C.P.R. accordingly assumed all debts, liabilities, obligations, and duties of those companies, and they were dissolved. Two companies, the Interprovincial & James Bay Railway Company, and the Northern Colonisation Railway Company are to be dealt with in 1957.

British Transport Commission Traffic Receipts

FOR the four weeks (Period 8) ended August 11, which, both this year and last, included the Bank Holiday, British Railways passenger receipts show an increase of £1,684,000 over the 1956 figure; this is less, perhaps, than might have been expected in view of the provincial bus strike last month. The effect of the strike is apparent in the British Transport Commission provincial and Scottish bus receipts: £3,852,000 compared with £5,626,000 for Period 8 of 1956. Ships' passenger receipts at £1,369,000 are well up on last year, though with constantly increasing costs, it seems probable that considerably higher revenue will be necessary during the peak summer holiday weeks if these services are to be maintained on a satisfactory commercial basis.

—	Four week to August 11		Incr. or decr.	Aggregate for 32 weeks		Incr. or decr.
	1957	1956		1957	1956	
	£000	£000	£000	£000	£000	£000
Passengers—						
British Railways ..	16,813	15,129	+ 1,684	89,127	78,902	+ 10,225
London Transport:						
Railways	1,707	1,643	+ 64	14,235	13,329	+ 906
Road services ..	4,519	4,242	+ 277	36,832	33,821	+ 3,011
Provincial & Scottish buses	3,852	5,626	− 1,774	35,493	34,503	+ 990
Ships	1,369	1,278	+ 91	4,263	3,976	+ 287
Total passengers ..	28,260	27,918	+ 342	179,950	164,531	+ 15,419
Freight, Parcels & Mails—						
British Railways:						
Merchandise & livestock	6,624	6,510	+ 114	66,637	62,846	+ 3,791
Minerals	3,310	3,286	+ 24	32,394	31,415	+ 979
Coal & coke ..	7,251	7,022	+ 229	76,494	76,527	− 33
Parcels, etc., by passenger train ..	3,767	3,607	+ 160	30,497	28,473	+ 2,024
Collection & delivery, etc. ..	924	932	− 8	8,351	7,813	+ 538
Total Freight, British Railways	21,876	21,357	+ 519	214,373	207,074	+ 7,299
Others*	3,962	3,787	+ 175	33,592	34,042	− 450
Total Freight, Parcels & Mails	25,838	25,144	+ 694	247,965	241,116	+ 6,849
Total	54,098	53,062	+ 1,036	427,915	405,647	+ 22,268

* Inland waterways freight, road haulage and ships

The Bank Holiday and, perhaps, annual holidays affecting industrial production in some districts would normally cause British Railways freight and parcels receipts for Period 8 to be less than those for the preceding four weeks. Nevertheless, with an increase of 10 per cent in most freight rates on August 1, and the new charges scheme in operation since July 1—though it would be unreasonable to expect much immediate result from the scheme in so short a time—rather more might have been hoped for than the receipts of £6,624,000 from British Railways merchandise and livestock traffic, which compares with £7,689,000, £7,900,000, and £8,139,000 for Periods 7, 6, and 5 respectively, and does not much exceed the corresponding figure for last year. Mineral, coal and coke, and parcels receipts are likewise disappointing. For the 32 weeks the increase in British Railways freight receipts over the previous year's figure is only £7,299,000, against £15,467,000 at the end of Period 8 last year.

	Four weeks to August 11	Thirty-two weeks to August 11
British Railways—		
Passengers	+11·1	+12·9
Parcels	+ 4·4	+ 7·1
Merchandise & livestock	+ 1·7	+ 6·0
Minerals	+ 0·7	+ 3·1
Coal & coke	+ 3·2	—
C. & D. services	− 0·8	+ 6·8
Total	+ 6·0	+ 6·1
Ships (passengers)	+ 7·1	+ 7·2
British Road Services, Inland Waterways, and Ships (cargo)	+ 4·6	− 1·3
Road Passenger Transport, Provincial & Scottish	−31·5	+ 2·8
London Transport—		
Railways	+ 3·8	+ 6·7
Road services	+ 6·5	+ 8·9
Total	+ 5·7	+ 8·3
Aggregate	+ 1·9	+ 5·4

Letters to the Editor

(*The Editor is not responsible for opinions of correspondents*)

London Midland Region Services

August 25

SIR,—You commented when reviewing the summer timetables upon the slow train service between Liverpool and Manchester on the one hand and Glasgow and Edinburgh on the other. As year after year passes without attempt to improve this service, its deficiencies deserve stress. The following comparison is relevant and serves to show how railway business traffic is thrown away:—

Morning service

Manchester Victoria	dep.	9.30 a.m.
Glasgow Central	arr.	2.50 p.m.
Manchester Air Terminal ..	dep.	7.30 a.m.
Glasgow St. Enoch Square ..	arr.	10.00 a.m.

Afternoon service

Manchester Exchange	dep.	4.15 p.m.
Glasgow Central	arr.	10.10 p.m.
Manchester Air Terminal ..	dep.	5.35 p.m.
Glasgow St. Enoch Square ..	arr.	8.05 p.m.

The air services are timed so obviously at just the hours which the traveller desires. They operate on Saturday, when the train service is even slower than that quoted, and are evidently felt to justify "Viscount" aircraft. Further, they offer a corresponding Sunday evening service and the railways do not. Railway managements seem unaware that there exists a demand for evening non-stop services between the principal cities at times as fast as the best achieved during the week and that potential travellers by these services are driven constantly to the roads and air.

The weekday evening train from Glasgow (4.05 p.m.) to Manchester is due at Preston 8.46 p.m. (admittedly not often on time) and is then allowed 84 min. Manchester Victoria (about 31 miles by conventional route); it even calls at Tyldesley in an effort to while away its time as tradition, not traffic, demands.

Manchester has benefited by the recasting of the Midland services but there are some surprising deficiencies here. The useful 6.50 p.m. from St. Pancras to Manchester has no restaurant or buffet car (the summary table, incidentally, says it does) and the potentially useful 5.55 p.m. has no refreshment car and makes so many stops as to render it useless as a through train; its stops are useful but should be served by a following train from Leicester, as is done at other times of day. The Sunday service on the Midland shows no improvement; could not trains after 4 p.m. (when one expects engineering work to be over) be timed as on Monday to Friday?

Yours faithfully,

HAROLD D. BOWTELL

29, Langdale Road, Victoria Park, Manchester, 14

THE SCRAP HEAP

Excess Firing?

Extracted from the "Remarks Column" of the G.T.R. of No. 155 Goods of March 16, 1957:—"23 minutes delay—Engine 6018 giving trouble—pistol becoming hot."—*From "East African Railways & Harbours Magazine."*

Work for Old New Zealand Engines

In the last 57 years the New Zealand Railways have disposed of more than 500 out-dated or worn-out locomotives. Many of them have been broken up for scrap; some have formed the foundation of stop-banks for soil conservation works; a few have been sold overseas. Quite a number are still in use in New Zealand.

Tucked away on private lines owned by logging companies, freezing works, cement and lime companies, and even the Army, are engines built as long ago as 1876. The oldest locomotive still in existence in the Dominion is F13, a six-wheel, saddle-tank used as a reserve engine at Lyttelton. The only privately-owned railway in New Zealand which carries passengers uses three former Railways Department locomotives, including two "X" class locomotives, which were recently retired. This railway is run by the Ohai Railway Board in Southland and is 11 miles long.

The resale value of locomotives varies with their age and condition. A "WAB" class engine, formerly used on the Hutt Valley suburban trains, was recently sold for £2,000. The buyer traded in a shunting engine.

E.R. Diesel on Southern Electric

An excursion train of two two-car diesel units ran recently on a Sunday from Southend Central, on the L.T.S. Line of the Eastern Region, to Littlehampton, conveying 250 passengers. The journey in each direction is reported to have taken some 4 hr. The route was Barking—Woodgrange Park —Harringay Park—Gospel Oak—Willesden Junction High Level, and thence over the West London Railway to the Southern Region electrified system.

Good Service

My son sent a suitcase by rail from his school in Nottinghamshire, unlocked and secured only with a strap. It arrived safely, with the contents intact. He also despatched by rail a fragile 11-ft. canvas canoe, uninsured, which was not only undamaged but, although merely addressed to Sandown railway station, was delivered to my home by British Road Services.—*From a letter to "The Daily Telegraph."*

Expensive Experiment

A six-year-old boy, who "wanted to see a train go on two tracks," moved the points over which a freight train was standing at Winchester, Virginia. When the train started again, six freight cars were derailed, an electric power line was demolished, four motorcars standing by the line were smashed, a freight car ran into the side of a warehouse, and the traffic control system of the town was put out of order. Damage estimated at £12,500 was caused but nobody was injured. No action was taken against the boy.

Rival to the Camel

Patrick Balfour recalls in his book about Cyprus that in the early years of this century, when a railway line was to be constructed from Nicosia to Famagusta, the mayor of another coastal town, Larnaca, was approached in order to find out if the railway could be built there as well. After some consideration he decided that its arrival would put large numbers of camel drivers out of business and that he would rather do without it. The resulting decline in the town's prosperity might well have been averted by a more totalitarian government, but in this instance the mayor's objection was heeded. Since then most ships have unloaded only at Famagusta, where there was the railway to carry their stores away, while the port facilities at Larnaca have remained almost as they were 50 years ago.—*From "The Manchester Guardian."*

[The Cyprus Government Railway was closed on December 31, 1951.]

Will the Railways Pay? (1857)

(*The Great Western Railway dividend had fallen to* 1 *per cent*)

What do the unbiased, undeluded public think of the 20 miles of new line from Salisbury to Warminster turning out profitable by supplying the neat little city of Salisbury with coal? What do they think of the 53 miles of new line from Frome to Weymouth, paying some day by the increased influx of visitors to George III's favourite watering-place? What will make the nine miles from Bathampton to Bradford pay? As for the half-dozen little forks and branches, no doubt they are very convenient to the people of Uxbridge, Henley, and Melksham; but will the increase of traffic cover the interest on the capital sunk and the increased working expenses?—*From "The Times" of August* 14, 1857.

Home Thoughts

(*Hourly diesels on the Portsmouth-Andover line. See our August* 9 *issue*)

Things will "hot up" in my Valley,
Where the peaceful cattle graze,
When the Battle of the Branch Lines
Enters on another phase.

And the old, familiar whistle
Is replaced by eldritch shrills,
As the diesel duckhorns, honking,
Echo round those ancient hills.

Evidently someone reckons
There's a future for the train;
Can it be the tide is turning?
Will the old line live again?

Will the little stations rally,
When, with unfamiliar power,
Trains run up and down the branch line,
Regularly every hour?

Though the fishing folk may boggle,
By the trout-infested Test,
And the strident horn bring terror
To the little moorhen's nest,

If it takes a snort of diesels,
Decently anonymous,
To regain those rural regions
Abdicated to the bus,

I, though linked with lovelier eras,
No reluctance will display
To proclaim with countless others:
"Golly! That will be the day!"

A. B.

Passengers detraining at Littlehampton, Southern Region, from an Eastern Region four-car diesel excursion from Southend

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

VICTORIA

Doubling of Track

About two miles of electrified track being duplicated between Croydon and Mooroolbark was expected recently to be ready for use very shortly. The work involved two concrete and steel bridges, replacement of two timber bridges by concrete and steel structures, and erection of steel structures for overhead wires in place of existing wooden poles. A new substation has been built at Hull Road, and additional stabling sidings will be provided at Croydon. Steel overhead structures will also replace wooden poles between Mooroolbark and Hull Road, although this section will not be duplicated.

EAST AFRICA

Improvements at Dar es Salaam Port

Projects costing some £380,000 are already under construction or planned to commence this year by the East African Railways & Harbours Administration at Dar es Salaam. These improvements to dock works consist of a siding linking the deep-water berths with a warehouse and industrial area, a new oil jetty, the construction of new port offices, and the replacement of the old dhow wharf with a new structure.

By the end of the year the Dar es Salaam Warehousing & Industrial Area, situated to the back and southwards of the deep-water berths, will be ready for development, and the Railways & Harbours Administration will provide rail facilities by means of a 4,000 ft. single-line siding and an initial two-rail spur, with provision for a further five spurs when such are required. The rail link, costing some £50,600, necessitates the cutting away of some 90,000 tons of earth from the bluff at the back of the deep water berths to effect the 1·5 grade from the berth level to that of the warehousing area.

ARGENTINA

New Underground Line

The Minister of Transport, Admiral Sadi E. Bonnet, recently opened the tenders for the construction of the new underground line which will link Plaza Mayo with the Constitución-Boedo line. When finished, it will be possible to travel from Plaza Mayo to Boedo in 11 min. and pressure on other means of transport will be considerably relieved. Two new stations, Bolivar (Plaza Mayo) and Belgrano, will be built, the others being Independencia (interchange with the Retiro-Constitución line) and San José, on the Constitución-Boedo line. A subway will be constructed to connect Bolivar station with Perú (Plaza Mayo-Primera Junta line) and Florida (Florida-Palermo line). The existing one-platform station at Boedo will be replaced by a larger one.

Plans for two new underground lines are under study. The first will link Parque Patricios with Avenida Libertador San Martín (Recoleta), passing under Jujuy street and Avenida Pueyrredón and connecting with the existing A, B, D, and E lines. The other will connect Constitución with Avellaneda, passing under the Riachuelo river (boundary between the Federal Capital and Avellaneda). A second subway will be built to relieve pressure on the present one connecting Lima (Plaza Mayo-Primera Junta line) and Avenida de Mayo (Constitución-Retiro line).

AUSTRIA

Electric Motor Baggage Vans

Twelve electric motor baggage vans of 2,200 h.p., with ample baggage space in addition to the driving compartment, are on order from several builders. They are to work, hauling trailers, on fast internal services within Austria.

FRANCE

Increase in Traffic

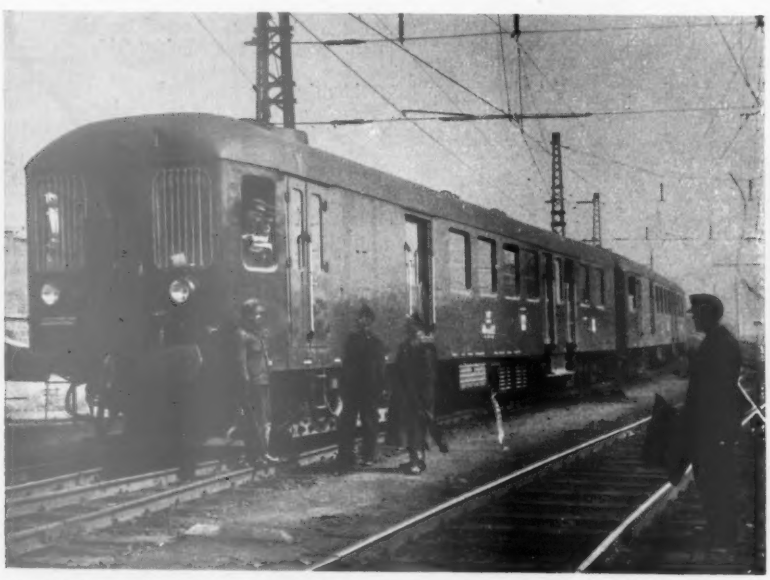
The S.N.C.F. has announced a further increase in traffic, both passenger and freight, for the first half of 1957. The system carried 279,000,000 passengers against 262,000,000 during the same period in 1956, an increase of 6·5 per cent. This rise was even more marked in terms of passenger km., which rose to 14,900,000,000 units against 13,400,000,000 for the first half of 1956, an increase of more than 10 per cent. The increase in freight traffic was approximately 8 per cent, with 107,700,000 metric tons against 99,600,000 for the same period in 1956, and 26,700,000,000 *tonne*-km., against 24,700,000,000.

Lightweight Portable Wireless Sets

After considerable research, the S.N.C.F. has brought into use a lightweight portable wireless transmitting/receiving set to enable communication to take place between staff checking wagons, marshalling trains, testing brakes, and so on. This set, known as X 137, has been developed and built by the manufacturers to S.N.C.F. specifications and weighs only 4½ lb. The complete equipment consists of a metal container measuring approximately 8¼ in. × 5½ in. × 3 in., which is divided into two sections; the upper section contains the transmitter/receiver proper with valves and transistors, while the lower section contains the batteries to feed the valves, etc. The box is carried on the chest by means of a strap around the neck.

Besides the box, there is a combined microphone and loud speaker which

Ten-Wheel Diesel Motor Coaches in Hungary



New type of 10-wheel Ganz motor coach used on Hungarian State Railways high-speed services on Kelebia, Békéscsaba, and Szombathely routes

can be plugged into a terminal on the top of the box, and a small aerial, approximately 1 ft. 6 in. long. The apparatus is completely self-contained and can be used for a continuous period of 5-6 hr., which is sufficient to cover the normal working day. It has a minimum effective range of 1 km. (⅝ mile), but this can be extended to 2 or 3 km. when conditions are favourable.

ITALY

Couchette Services

Passenger services offering *couchette* accommodation include that between Rome and the Franco-Spanish frontier at Hendaye/Irun via Genoa, Ventimiglia, Marseilles, Narbonne, Toulouse, and Lourdes. The same facility will be available shortly—for the first time in an internal service in Italy—between Rome and Lecce (in Apulia).

SWEDEN

Concrete Sleepers

In 1953, the State Railways began trials with concrete sleepers on a 2-km. section between Nässjö and Solberga, on which four types of sleeper were laid (two German and two Swedish), all monolithic, with different types of prestressed reinforcing and different types of rail fastening. In all, 3,200 sleepers were laid. In the autumn of the same year, 5,000 ordinary sleepers were laid on sidings. The laying of concrete sleepers on some main lines continued during the autumn of 1954 with 3,200 sleepers, 1 km. of which were in macadam and 1 km. in gravel ballast. As a result of these trials, the State Railways, during 1957, laid about 5,000 " tubular " sleepers (two blocks of concrete joined by a tube) between Tranäs and Gripenberg. These sleepers were made in Sweden by the State Railways, as also a rail fastening which consists of a saddle-shaped spring which grips the flange of the rail and is held down by a bolt passing through the sleeper.

Safety Device for Carriage Locks

To prevent falls from moving trains the State Railways first experimented with a device fitted to the ordinary locks so that two operations were necessary before the door could be opened. Whilst this prevented passengers from opening the doors involuntarily, anyone who for any reason wished to open the door had no difficulty in doing so.

A locking device was then tried which was entirely automatic and operated by the coach dynamo. This consists of an electro-magnet connected to the battery of the coach through a relay operated by the dynamo. The relay is regulated in such a way that the magnet attracts as soon as the train reaches a speed of 15 km.p.h., and releases at a speed of 2—3 km.p.h. The magnet can be very small (the travel of the armature is only 4 mm.) as it blocks a pivoted arm which, in turn, bolts the door.

This device has now been tried on certain coaches for a considerable period without any defects worthy of note.

Library Railcars

In the sparsely populated region of Lapland between Kiruna and the Swedish/Norwegian frontier on the electrified Narvik line, a mobile lending library in the form of a railcar, has been in operation for some time on the third Sunday of each month. A librarian of the municipal library of Kiruna deals with the loans.

In view of the growing popularity of this library railcar, another has now been placed into service on the southern part of the same line, between Gällivare and Kalixfors, one Sunday a month.

Railwaymen are among the chief borrowers.

Publications Received

Fifty Years of the Hampstead Tube. By Charles E. Lee. Published by London Transport, 55, Broadway, London, S.W.1. 8½ in. × 5½ in. 28 pp. + 8 pp. plates. Stiff paper covers. Price 2s.—Issued to mark the 50th anniversary of the opening of the Charing Cross, Euston & Hampstead Railway (popularly known as the Hampstead Tube) this booklet traces the history of the original undertaking and its development into the Northern Line of today. Among the interesting details is an explanation of the adoption of the unusual standard tube diameter of 11 ft. 8¼ in. The illustrations are particularly striking in that they afford a contrast between rolling stock, equipment, and stations of the present time and bygone years.

Nahverkehrsbahnen der Grosstädte (*Local Rail Transport Facilities in Large Cities*): by Dr. W. Lambert; 73 pages of text, 10½ in. x 7½ in. with numerous drawings and tables forming a lengthy appendix. Published by Springer Verlag, Berlin-Göttingen-Heidelberg, as No. 18 of a series issued by the Transport Research Institute, Stuttgart.—This has been issued in continuation of a policy comparatively recently adopted by the Institute of extending its work to cover all forms of transport and their problems. Originally it was the intention to deal with air transport questions only. The present study consists of a complete investigation into the problems connected with improving the means of transport in cities and especially by arrangements for expanding them in a vertical rather than a lateral direction and constructing underground and elevated railways—or tramways—along the course of present means of communication in order to duplicate existing capacity, while of course making certain new routes of their own. The various arrangements handled, investigated in detail down to items such as signalling and maintenance facilities, are treated with the aid of comprehensive tables and drawings from both the engineering and economic points of view, and one of the purposes of the work—to enable the costs of the different kinds of service and the equipment going with them, and so on, to be readily referred to—is certainly achieved.

High Mileage—Under the title of *A Record of Endurance*, a four-page coloured folder from Alsthom gives particulars of the 438,324 km. (272,548 miles) built up by electric locomotive No. CC. 7147 in 220 consecutive days between Paris and Lyons, hauling an average load of 740 tons at an average speed of 68 m.p.h. The locomotive then having accumulated 600,000 km. (372,823 miles), it was brought in for normal general overhaul.

Transport Age No. 2.—The second issue of this quarterly British Transport Commission periodical, designed to act as a link between the various undertakings of the Commission and the industries served, maintains the standard of its predecessor. Of particular interest is an article by G. W. Dymond, " Moving the Nation's Coal," which emphasises the large part played by British Railways in handling this important traffic. Another article describes the part of transport in aluminium production, and there is an informative article on the industrial perspective in South Wales. Many of the well-produced illustrations are in colour.

British Transport Filmstrip Catalogue.—This catalogue of nearly 70 filmstrips is an open door to many an evening's entertainment or instruction for clubs, societies, and similar organisations. The filmstrips vary in length from the 28 frames of " Coal by Canal " to the 77 of " Go as you please in Somerset and Devon," and are either captioned or accompanied by lecture notes. From this catalogue, available on application to British Transport Films, 25, Savile Row, London, W.1, price 6d., a programme can be arranged to suit almost any tastes.

The Steelfounder's Craft.—An illustrated booklet which deals with the company's steel foundries at Letchworth has been produced by K. & L. Steelfounders & Engineers Limited, Letchworth, Herts. Various departments of the Foundry Division, which produces over 15,000 tons of castings a year, are shown and described. The book deals with the whole series of operations from the initial design of the pattern to the final stage of inspection and testing. Copies may be obtained from the company.

Moghalsarai Yard, Eastern Railway of India

Functions and working of largest marshalling yard in India

Down Classification Yard, looking east, with transhipment platforms in left background

MOGHALSARAI, probably the biggest marshalling yard in Asia, is at the junction of two of the most important railways in Northern India, the Eastern and the Northern Railways, the former being the working railway. Four different routes of the two railways, the Main Line and the Grand Chord of the Eastern Railway and the Allahabad and Lucknow sections of the Northern Railway, converge on Moghalsarai, making it the hub of the transport system in this part of the country. The real importance of this yard lies in its being the distributing point of coal produced in the Bihar and Bengal coalfields for all destinations in North, Central, and Western India.

The Grand Chord, which carries the predominant share of the coal traffic, and the Main Line converge at Moghalsarai after having bifurcated at Sitarampur, which is in the heart of Raniganj coalfield. Both these sections have double tracks right from coalfields up to Moghalsarai. After converging at Moghalsarai, two double tracks diverge beyond it, one towards Allahabad and the other towards Lucknow Division of the Northern Railway. Moghalsarai is situated 418 miles from Calcutta Howrah and falls within the civil jurisdiction of Banaras (Benares) District.

It is a Special Class station situated on the level. Its interlocking is of Standard III and double-line block instruments are in use. The total route-mileage of Moghalsarai yard is four miles and the track-mileage 122.

Signalling

Four block cabins control the reception and despatch of trains, movement of train engines and pilots and transfer of loads from one yard to another. These cabins are: (1) Junction Cabin with 77 levers including spare at the east extremity; (2) Crossing Cabin with 47 levers including spare; (3) East Cabin with 130 levers including spare; and (4) West Cabin with 135 levers including spare.

There is also one auxiliary cabin called the West Central Cabin, which has 45 levers including spare.

Capacity of Yard

Moghalsarai yard was originally designed for a capacity of about 1,400 wagons. Pending major remodelling of the yard which will extend over the Second Five-Year Plan period to cater for the traffic anticipated at the end of that period, the management is now working to a target of 2,200 wagons to be despatched to destinations above Moghalsarai. The best performance so far has been in April, 1957, when the daily despatches above Moghalsarai averaged 2,089 and in the down direction 2,080 working to a total of 4,169. This constitutes an increase of 58 per cent over the traffic figures of 1951.

The increased throughput is being achieved principally by: (1) more intensive supervision and "chasing"; (2) increased pilotage in the yard; and (3) running of through block loads formed in the coalfield yards to permit of their being received in the Central Yard and despatched with minimum detention.

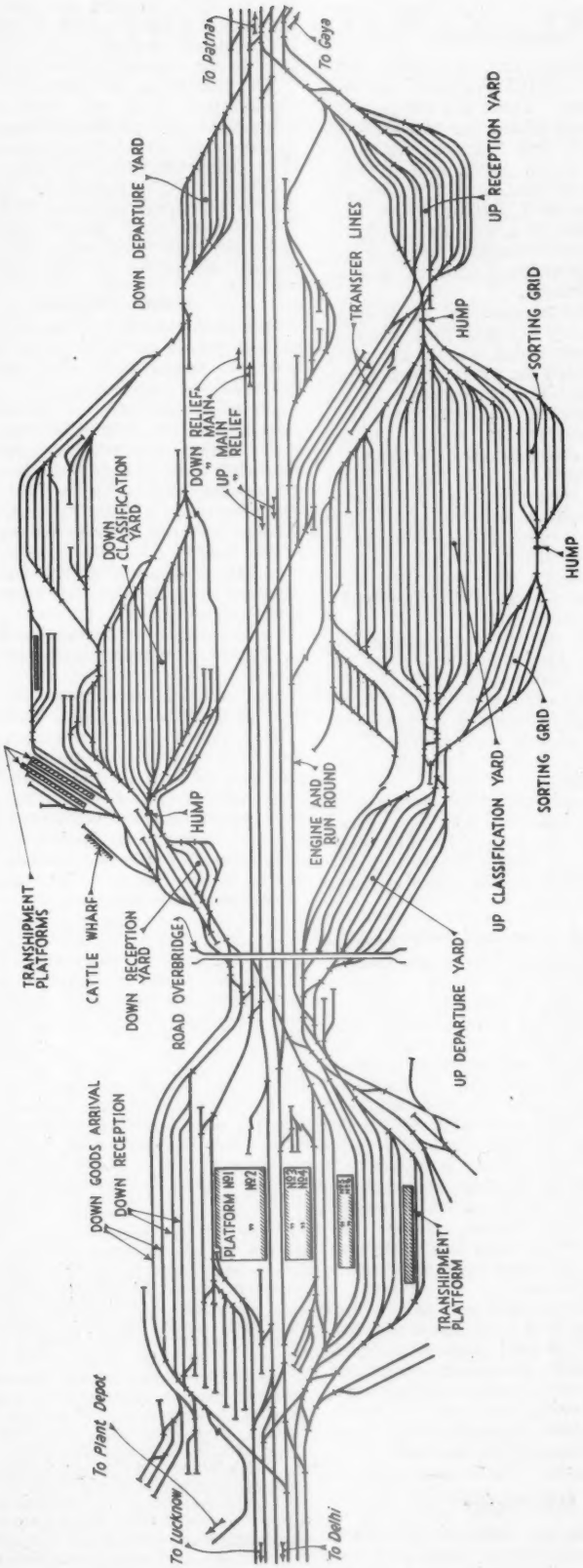
The additional facilities provided in the yard so far have been very meagre. As haphazard growth will be uneconomical in the long run, any remodelling that is done must fit in with the master plans for ultimate remodelling of the yard which will allow a throughput of 3,000 wagons. The master plans are nearing completion and work in connection with the remodelling of the yard is expected to be taken in hand soon. Meanwhile, emphasis remains on better utilisation of the existing resources with increased manpower and increased pilotage.

Flow of Traffic

Goods and coal traffic carried over the Eastern Railway for destinations beyond comes into Moghalsarai principally on through loads formed for Moghalsarai in the coalfields. These through loads carry mixed stock for different destinations. To supplement the capacity of Moghalsarai yard efforts are made to form as many block loads as possible for destinations beyond Moghalsarai right in the coalfield itself.

The number of such loads that can be formed in the coalfield yards is, however, limited by the pattern of day-to-day distribution given by the Coal Controller, who has to synchronise

View westwards over hump and Up Classification Yard



Layout of Moghalsarai marshalling yard, Eastern Railway of India, showing (on left) passenger station and relation to main lines

the demands of different grades of coal available in different areas of the coalfields for different parts of the country. The other limiting factor is the capacity of the depots in the coalfield itself.

Very close co-ordination is maintained with the Coal Controller to secure the allotment of maximum number of block rakes spread over the maximum number of depots in the coalfields so that their formation is possible by the marshalling resources available at each depot. With the best of efforts we have been able to achieve the best average of four to five block rakes which are formed in the coalfields and are run through Moghalsarai Central Yard after change of engines thus enabling passage of about 275 wagons through Moghalsarai without passing through the marshalling yard.

Similarly in the down direction, the trains carrying loaded wagons as well as covered and open empties are sorted out for different destinations and full train loads of loaded wagons, pure opens and pure covereds are formed for despatch towards coalfield yards. The problem of despatch in the down direction is, however, much simpler than in the up direction as the flow in the down direction is predominantly of empties and, therefore, the extent of marshalling required to be done in the Down Yard is much less.

Pure intensively examined empty loads are received in the Central Yard at Moghalsarai and run through to coalfields after change of engines. To assist the marshalling yard, empty loads which are not intensively examined also have to be run through the Central Yard after examination and change of engines. This practice is, however, normally discouraged and resort to termination of non-intensively examined empty loads in the Central Yard is taken only when the flow of traffic is too heavy for the Down Yard to cope with.

The present quota of trains from the Eastern Railway into Moghalsarai is 39 and the quota of trains towards Northern Railway is 37. In the Up Yard approximately 1,800 wagons are passed daily over the hump, which is one of the major limiting factors for the yard capacity, as the hump is not mechanised.

Description of Yard

Moghalsarai is functionally divided into two parts, one dealing with the goods work and the other with coaching. The two parts are called goods yard and coaching yard.

The goods yard consists of two large units known as Up Yard and Down Yard. Each yard is complete and self contained with separate sick lines, transhipment sheds, transfer lines, water columns, and so on. Occupying the two flanks of the Main Line on the other side, the Up Yard is on the south and the Down Yard on the north.

The Up Yard consists of:—

(*a*) receiving yard of 12 lines divided into two groups offering facility of simultaneous reception. Apart from

this, there are three centre yard lines with facilities for reception and despatch. Block rakes are received and despatched through these lines. Trains starting from the Up Departure Yard have to pass through these lines.

(*b*) The classification yard in continuation of the receiving yard with a connecting hump in between; it consists of 21 classification lines. In addition, there is a take-off to the upper grid consisting of six lines which converge on to a hump from where the lower grid takes off with six lines. The grids are mainly used for the formation of work and shunting goods trains.

The humping operations are under the overall control of a "gunner" on top of the hump from where he relays through an electrical indicating device the number of marshalling lines on which a wagon is required to be humped to the pointsman in the classification cabin, who is responsible for setting points for the required line.

The Departure Yard consists of 11 lines in continuation of the classification and lower grid yard lines with two necks to allow simultaneous drawing up of two loads.

After the formation of loads in the marshalling yard they are examined by a train examiner on a "safe to run" basis and drawn in the departure yard.

The Down Yard has a layout similar to that of the Up Yard, with eight receiving lines, 17 classification lines, and eight departure lines. There are four lines in the centre yard with facilities for direct reception and despatch.

Volume of Traffic

The rate of clearance of up and down traffic through Moghalsarai has been progressively on the increase during the last five years, as is shown by the following figures:—

—	Average daily despatches		
	Up	Down	Total
1952 ..	1,440	1,393	2,823
1953 ..	1,490	1,397	2,887
1954 ..	1,518	1,452	2,970
1955 ..	1,637	1,568	3,205
1956 ..	1,836	1,715	3,551

The despatches during 1956 would have been higher but for the serious breaches on the Main Line and Grand Chord Sections of the Eastern Railway in September, 1956, and on the Northern Railway in October, 1956, causing complete and partial suspension of movements respectively.

Despite the breaches in 1956, the average coal allotment for above Moghalsarai destinations was stepped up to 1,358 daily, against 1,026 wagons in 1952. The rest of the traffic to the Northern Railway and across consisted of general merchandise such as iron and steel, cement, petroleum and lubricants, fertilisers from Sindri, machinery, and other miscellaneous wares. The daily traffic in the reverse direction in 1956 consisted of 1,173 empties and 542 loaded wagons, the latter mostly of food-grains, piece-goods, gypsum for Sindry Fertiliser Factory, vegetable oils, and so on.

Coaching Yard

The coaching yard is directly under the control of the Platform Assistant Stationmaster. There are six platform lines with one centre line between platform lines 4 and 5 known as engine line. The 3 Up goods and 4 Down goods lines of the Centre Yard are also included in the Coaching Yard. The yard consists of a number of sidings for placement of coaching rakes, departmental wagons, staff shuttles, and inspection carriages.

The traffic organisation at Moghalsarai is mainly charged with watching the speed with which wagons are made to pass through the different operations in the yards. The performance of the yards is analysed daily to arrest any deterioration and to ensure quicker transit of wagons through the yards.

As indicated by the figures given above, the Moghalsarai yard formerly used to despatch an average of only about 2,650 wagons daily. But in recent years, as a result of intensive chasing and pre-planning, the yard has been able to handle more and more traffic in both the directions.

A central control organisation has been set up at Moghalsarai after regrouping of Railways in 1952, directly under the Railway Board with a Deputy Director (Rail Movement) charged with the co-ordination of the activities of the Eastern, Northern, Central, and Western Railways.

The station is under the charge of a Station Superintendent with three Head Yard Masters to assist him, one each for the Up and Down Yards and one for the Central Goods and Coaching Yard.

Re-packing Point and Sick Lines

The Moghalsarai Yard has a central repacking point for smalls. Traffic booked in smalls from Eastern Railway stations is clubbed in wagonloads for the re-packing shed from where the consignments are re-distributed in other wagonloads intended for destinations on Northern, Central, and Western Railways. Similarly, traffic in smalls booked on the Northern and other railways for Eastern Railway, is despatched in wagonloads to Moghalsarai, where it is repacked in the down transhipment shed. On an average, about 100 wagons are thus repacked daily at Moghalsarai in both up and down transhipment sheds.

Two separate sick lines, one in the Up and the other in the Down Yard, between them deal with about 90 wagons a day. In order to save the detention to wagons invariably involved in placement and drawing out from sick lines, as many of the damaged wagons as possible are repaired in the traffic yard itself.

Skid Porters

There being no automatic retarders in the Up and Down Yards and the humping operations being very intensive, arrangements were made in September, 1955, to post one skid porter for each marshalling line to minimise the incidence of damages and indirectly step up the capacity of the humps.

The incidence of damages in the classification yards has been reduced from the average of 734 wagons a month in the first eight months of 1955, after which additional skid porters were provided, to 273 wagons a month in the corresponding period of 1956. This is a typical case where mechanical deficiency has been made up by increased manpower for the yard.

Future Planning

It is estimated that by the end of the Second Five-Year Plan traffic passing through Moghalsarai will be some 2,500 wagons each way and a yard with 3,000 wagon capacity is planned. A master plan has, therefore, been prepared which mainly incorporates the following additional facilities to cut out the present bottlenecks:—

(*a*) Provision of two flyovers, one at the east and the other at the west end of the yard;

(*b*) Mechanisation of the Up hump yard with provision of automatic brake-retarders;

(*c*) Replacement of steam locomotives by diesel for shunting purposes in the yard;

(*d*) Provision of engine run round lines in the Up and Down Yards;

(*e*) Facilities for simultaneous reception and despatch of trains in both directions in both Up and Down Yards;

(*f*) Other improvements in the Down Yard such as mechanised Down Hump Yard and increasing the length of the lines to cater for longer wagons, to be put in hand after facilities mentioned above have been provided.

MORE LONDON TRANSPORT STATION MOTORCAR PARKS.—London Transport has announced that the number of cars now being parked at Underground stations has increased by 50 per cent in just over two years, and more and bigger car parks are to be built. More than 1,500 motorists daily are now leaving their cars at tube stations in the suburbs and travelling to London by train. This compares with 1,000 at the beginning of 1955. In the last two years London Transport has increased parking space from 1,280 cars to 1,955. Car parks at six tube stations are scheduled to be built or enlarged between now and the autumn, to take an extra 280 cars. These stations are: Arnos Grove, Piccadilly Line (80 more cars); Cockfosters, Piccadilly Line (75 more); East Finchley, Northern Line (new park for 43); Leytonstone, Central Line (27 more); Newbury Park, Central Line (48 more); Totteridge, Northern Line (seven more). Surveys for increased parking space are being undertaken at Amersham (Metropolitan Line); Edgware and Mill Hill East (Northern Line); South Harrow (Piccadilly Line) and South Woodford (Central Line). New parks at these places would bring the total car accommodation at Underground stations up to 2,500. During the Suez petrol rationing period there was a 10 per cent increase in Underground station car parking.

ELECTRIC RAILWAY TRACTION SECTION

Insulation for High Temperatures

ALTHOUGH it is a familiar aphorism that the capability of a steam locomotive rests on its capacity to boil water, the same standard is not normally applied to the electric motor. There is, however, a well-known connection between temperature and the limits of performance, and one manufacturer recently reported the construction 11 years ago of a small motor incorporating the then new silicone insulating materials, which was run for part of its life at a temperature high enough to boil a kettle of water standing on top of it. Silicones had been manufactured in the U.S.A. for some two years before the end of the second world war, when they were used almost exclusively for military purposes. The next decade saw their growing commercial application and their acceptance by the American Institution of Electrical Engineers as a new class of insulation known as Class H, with a temperature limit of 180°C compared with the limit of 130°C. of Class B materials. Last year the new British Standard on insulation of electrical equipment, B.S.2757, also recognised Class H, setting the same maximum hot spot temperature of 180°C., and since that time at least one manufacturer of traction equipment has announced that Class H insulation will be used in motors and chokes for British Railways 50-cycle motive power.

The British Standard defines Class H insulation as "Silicone elastomer and combinations of materials such as mica, glass fibre, asbestos, etc., with suitable bonding, impregnating or coating substances such as appropriate silicone resins." An outline of the characteristics of silicone insulation in its various forms was given in our issue of September 3, 1954, with examples of their application to traction motor armature and field coils. Another development which has become of increasing interest to the traction industry since the British Transport Commission took its decision last year to adopt the 50-cycle system has been the use of silicones in dry-type power transformers. It would seem an attractive proposition to dispense with oil, its circulating system and radiator in a motor coach transformer, but at the moment it is normal to use oil insulation and cooling on 25-kV. systems, and to adopt forced circulation in order to dissipate the relatively high copper losses which are accepted in order to achieve a light and compact transformer.

If the new insulation techniques enable transformers of suitable size to be air-cooled, whether by forced draught or natural ventilation, a useful step will have been taken in simplifying the auxiliary services of the 50-cycle motor coach. In locomotives the advantages would be of equal interest, and although the location of the transformer inside the body instead of on the underframe would necessitate forced cooling, a suitable air supply would be available from the motor blowers.

Another characteristic of silicones which is important in some overseas countries where electrification is in progress is their highly water-repellent property. A case is reported of diesel-electric locomotive motors on the Santa Fe Railroad which were completely immersed in a flood, but could be returned to service simply by flushing out with a steam jet and subsequently baking dry, whereas Class B motors in similar conditions required complete rewinding.

In some electric stock overseas the risk of flooding is already provided for by continuously-rated resistance notches for low-speed running, and in such circumstances silicone insulation might make a further contribution to the maintenance of a train service under difficulties. Heat-resistance, however, is of interest to all users of traction equipment, particularly since the trend towards the lightweight, four-axle locomotive has increased the demand made on the machines, and something like an international competition seems to be developing in making very slow starts with exceptional loads.

Cooling problems have been partly responsible for the design of two-motor locomotives, in which one machine in each bogie is geared to both axles and advantage is taken of the larger frame to increase the size of the air passages. Ventilating air forms a major auxiliary load; to reduce it by minimising losses in ducting it has been proposed that two-motor locomotives should carry a small blower in each bogie adjacent to the traction machine. These electrical and mechanical approaches to the problem of obtaining increased output from a traction motor of given size are now supported by the industrial chemist, whose work on insulating materials may in due course offer solutions to the problems of contact line-to-earth clearances on high-voltage systems as useful as the developments which have already been tested in connection with traction machines.

Fluorescent Lighting in L.T.E. Cars

SINCE 1944 London Transport has been active in promoting the development of fluorescent lighting in railway vehicles. In that year a car was put in service on the District Line in which 2-ft. tubes were operated three in series on the 600-V. d.c. traction supply. After the war a further experiment was carried out, using high-frequency a.c. from a motor-alternator, the vehicle in which the lighting was installed being a prototype coach incorporating new features to which it was desired to test public reactions. This experiment of 1946 was followed in 1950 by the adoption of fluorescent lighting for all "R" stock vehicles. In these cars 2-ft. tubes and resonant start circuits similar to those of the 1946 experimental coach are used, but the supply is taken at 850 c/s from a special winding on the motor-generator set. Similar power supply and circuit arrangements are used in the new prototype tube trains, the first of which was referred to in our August 16 issue, but here the tubes are 5 ft. in length, and arranged in a double line in the centre of the ceiling instead of being in the lower ceiling curve.

A Northern Line car with this lighting layout has been running for some time and experience with it has shown the desirability of operating the tubes at a slightly lower wattage than is usual with the 5-ft. size, namely 50 W. instead of 80 W. A tube car naturally affords much less mounting height than is available in the normal lighting installation, and care must be taken to avoid undue brightness near eye level both for seated and standing passengers. In the "R" stock and in the new tube trains the specially-adapted motor-generator sets have been supplied by the Metropolitan-Vickers Electrical Co. Ltd. and the lighting circuit components by the General Electric Co. Ltd. The chokes have toroidal cores of magnetic powder material which result in heating losses being negligible.

The development of fluorescent lighting for trains on a system as heavily loaded as that of London Transport indicates a general measure of acceptance of this form of illumination by the travelling public and may have its effect on the future course of illumination practice in main-line stock. Under the British Railways electrification plan, a source of supply at the normal lighting frequency of 50 c/s and at suitable voltage will be available on the locomotives, and the higher frequencies which hitherto have characterised railway vehicle fluorescent systems, in order to take advantage of the simplicity of resonant start circuits, may no longer be required, as various 50-cycle circuits are now available in which the starter switch—a possible source of weakness in conditions of vibration—is dispensed with.

Electric Traction from Amsterdam to Brussels

Multiple-unit trains for inter-running between 1,500-V. d.c. and 3,000-V. d.c. systems

By J. E. J. Ankersmit, Engineer, Netherlands Railways

THE rapid development of main-line electric traction has given increasing importance to the problem of electrifying international railway connections. Both in Belgium and the Netherlands, therefore, demand for an electrified line between the capitals of the two countries has been a subject of topical interest.

In 1939 negotiations on this electrification project were conducted between the Belgian National Railways and the Netherlands Railways, but were interrupted by the second world war. In 1953, on the initiative of the Netherlands Railways management, discussions were resumed as a result of which a joint study was undertaken by officers of both administrations, in which representatives of Belgian and Dutch industry also took part later.

In consequence, the 1957 summer train service between Amsterdam and Brussels is being operated completely in both directions by electric traction, while with effect from October next an electrified service will also be worked between the two capitals by multiple-unit sets built specially for the purpose. A fundamental technical problem arose from the fact that the traction systems in the two countries are different, being 3,000 V. d.c. in Belgium, and 1,500 V. d.c. in Holland. The joint study of the whole matter, however, has made it possible to find a satisfactory solution for these and similar questions, both as regards locomotive-hauled trains and electric multiple-unit sets.

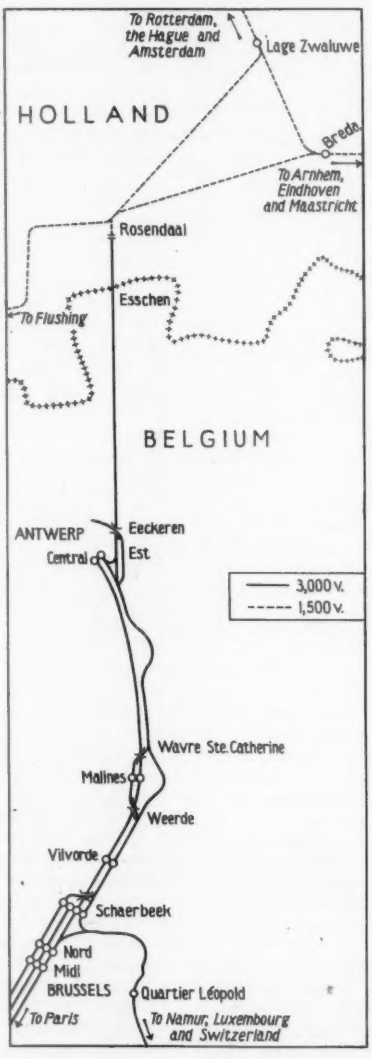
Service Requirements

The plan provides for an hourly service to be operated by electric twin-unit train sets specially built for the purpose and equipped with a dual-voltage installation by means of which the required maximum speed of 77 m.p.h. can be obtained on both the 3,000-V. and the 1,500-V. systems.

In principle this service will depart at alternate hours from Antwerp Central and Brussels Midi and will terminate similarly. It will take 3 hr. 18 min. to cover the distance between Amsterdam and Brussels Midi. On the Amsterdam-Rotterdam section the trains will be coupled to Netherlands Railways internal trains. Customs examination will take place on Dutch territory in the train between Dordrecht and Roosendaal; and on Belgian territory between Roosendaal and Antwerp.

Including the required reserve stock, this service will need 12 train sets, four of which are owned by the Belgian National Railways, and eight by the Netherlands Railways. This is approximately in proportion to the distance to be covered in both countries.

The Belgian 3,000-V. system has been extended as far as Roosendaal, the transition to the Dutch 1,500-V. system taking place immediately south of the Roosendaal station area. For the haulage of international trains on the Amsterdam-Roosendaal line, a 1,500-V. Netherlands Railways electric locomotive will be used as at present; on the Roosendaal-Brussels section a 3,000-V. Belgian locomotive will be used in each direction, although running at reduced speed on the 1,500-V. system. Thus, it is possible for a Belgian electric locomotive to take over an international train from Amsterdam at Roosendaal and to leave the station with this train under the 1,500-V. system. As the 3,000 V. tension for this locomotive is available immediately outside the station area, the normal speed is soon attained.



Route diagram, showing junction between the systems

The whole of the rolling stock for the 12 train sets will be maintained normally in Netherlands Railways workshops. As regards economic aspects of the joint operation of these train sets, an agreement has been made between the administrations.

Engineering Works

In Holland approximately 4½ miles of double line from Roosendaal to Essen (frontier) have been electrified on the 3,000-V. system. The overhead equipment is in accordance with the construction normally used by the Netherlands Railways (a single main catenary with Y-shaped supplementary catenary at each span) except that the copper section was reduced to ± 0·54 sq. in. per line, as used in Belgium, as a result of which it was unnecessary to install the auxiliary catenary normal in the Netherlands. The insulators are of the type usual on the Netherlands Railways as it was ascertained they also conform with the Belgian specification.

The separation between the 3,000-V. and the 1,500-V. systems south of Roosendaal, has been effected very simply by arranging the wires at either end of the respective systems to run gradually upwards and terminate, this being the normal Netherlands procedure in the case of "dead" sections at bridges.

It follows that, quite apart from simplicity in construction, it has been ensured that contact between the two current systems is impossible during the passage of a train, which naturally increases the reliability of the service to a very great extent.

Apart from the electrification works this line has also been equipped with the automatic block system including the usual daylight signals.

As is well known, contrary to practice in the Netherlands, left-hand running obtains in Belgium. The transition between the two systems was originally at the Belgian-Dutch frontier near Essen and caused the international trains in particular to reduce speed considerably. Within the scope of the electrification the two administrations agreed to transfer the change-over in working to Roosendaal, which has effectively speeded up the service. In Belgium, for electrification of the Antwerp Central—Antwerp Est—Essen section, the overhead equipment is in accordance with Belgian practice,

an auxiliary catenary being placed over the whole length under the main catenary for the suspension of the contact wires. The transition between the Belgian and Dutch constructions has been carried out by means of an open overlap span arrangement, situated at the Belgian-Dutch frontier immediately north of the Essen station area and designed in joint consultation between the two administrations. This installation contains constructional elements both of Belgian and Dutch origin.

Ekeren Substation

For the supply of current to this line (including the Dutch section, Essen—Roosendaal) a substation was built by the Belgian National Railways north of Antwerp, near Ekeren, in which three rectifier groups, each of 3,000 kW., have been installed.

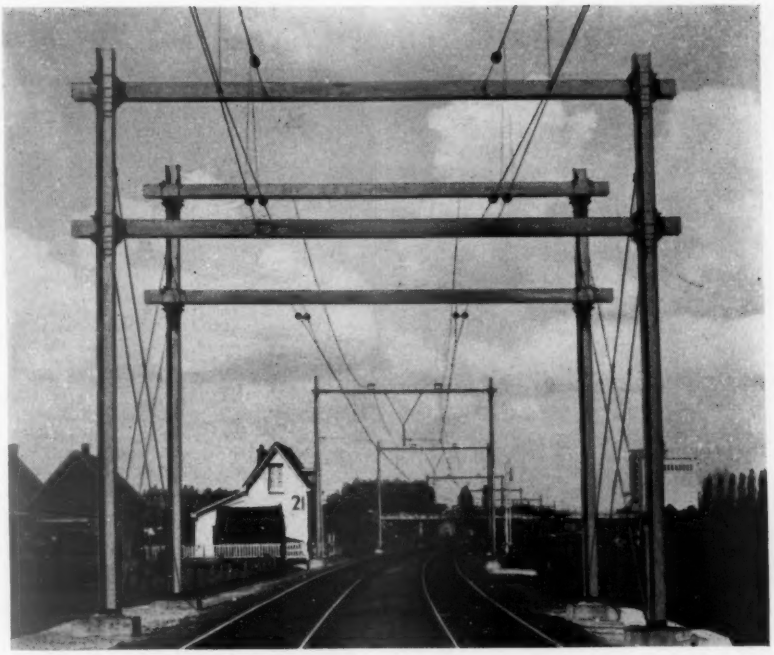
Electric power is obtained from the power station at Merksem, near Antwerp, *via* the Société Auxiliaire pour la Fourniture d'Energie de Traction at a tension of 15 kV. A switching station was also built at Essen.

The electrification system of the Antwerp Central Station area, where the trains in the hourly service reverse, has been extended. There are two rail connections between Antwerp and Brussels, known as lines 25 and 27. As a result of the high frequency of the traffic on line 25, which is used for the electric shuttle service between the two cities, the new service will be run over line 27, which is normally used for goods traffic and international trains. Because of work being carried out at Malines Station the trains will be routed temporarily over the St. Katelijne-Waver-Weerde line around Malines. It is expected that in 1958 the work will have made such progress as to permit direct running.

New Rolling Stock

As already mentioned, the train sets were designed jointly by the Belgian National Railways and the Netherlands Railways and both the Belgian and Dutch industries were closely concerned.

The mechanical part, comprising the carriage bodies, their interiors, the bogies, and the brake equipment has been built to Dutch specification by Werkspoor, Amsterdam. The electrical equipment comes from Belgium, being supplied by the Ateliers de Constructions Electriques at Charleroi and the Société Electro-Mécanique at Ghent.



Terminations of 1,500-V. and 3,000-V. systems south of Roosendaal

Mechanical Features

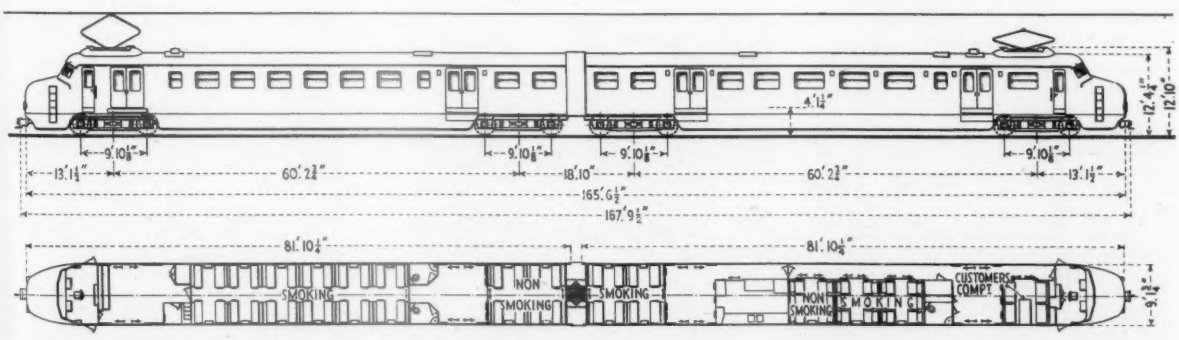
The mechanical part is generally similar to that of the latest electric two-car sets used by the Netherlands Railways for internal services. Each coach is carried on two bogies, the four traction motors being fitted in the two motor bogies. By comparison with the latest Netherlands Railways stock, the interior has undergone a few changes because of the international character of the new service. Amongst other things, the sets have been provided with simply furnished refreshment accommodation and a Customs compartment.

Furthermore, in accordance with Belgian practice, automatic sliding doors have been provided, although this system is not used in the Netherlands for technical and operational reasons. As it should be possible for the sets to be worked in multiple with existing Netherlands Railways streamlined stock, they are provided with the Netherlands Railways automatic coupling system; coupling by means of Belgian equipment, therefore, is not possible.

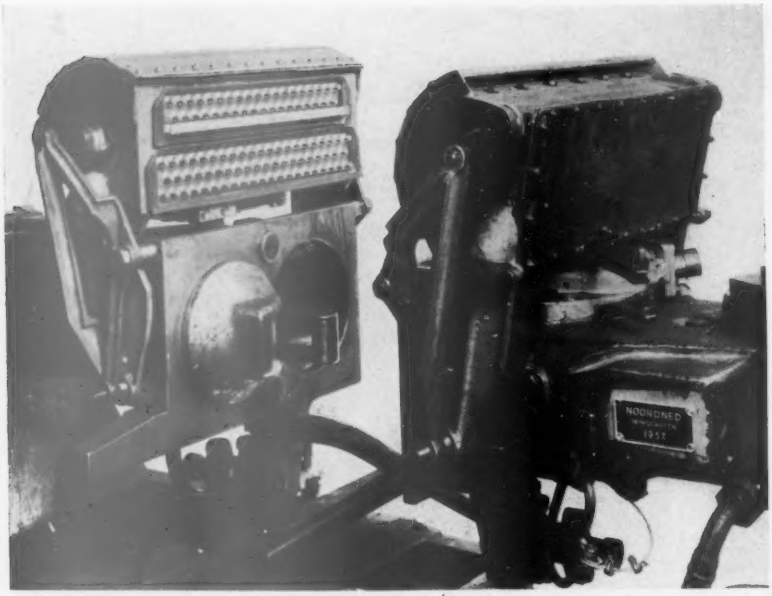
Air Pipe Connections

Apart from the mechanical connection this automatic coupling system also serves the purpose of connecting a number of air pipes (the pipes of the main reservoir and the fill and brake pipe), together with a number of electrical connections for the control circuits.

In addition to connections of a general nature, a number of special connections are required when two or more of the



Dual-voltage two-car set designed jointly by the Netherlands and Belgian National Railways



Automatic coupler for Dutch/Belgian dual-voltage stock, showing control line contact block raised

new sets are coupled, for reasons explained in the following paragraphs dealing with the electrical equipment. The contacts for these are combined in a separate block which has been added to the existing coupling gear.

Electrical Equipment

The electrical equipment is designed to meet the following conditions:

1. The installation must be suitable for both systems of current (*i.e.* 1,500 V. and 3,000 V. d.c.).

2. The train sets must be capable of being coupled to the existing Netherlands Railways stock.

Both conditions have influenced the design of the installation considerably. Condition 1 made dual-voltage switching necessary. In principle, the traction equipment consists of two similar groups, each consisting of two motors with their starting resistances, contactors, etc. The motors are wound for 1,500 V. across the brushes.

By means of an electro-pneumatic two-position drum switch the two groups are connected in parallel on 1,500 V. and in series on 3,000 V. Thus on both voltages exactly similar conditions are obtained for the motors. The control cylinder is operated from the driver's cab, where its position is indicated. By means of the contactors and starting resistances in each group of motors the following running notches, coresponding to those of the Netherlands Railways stock, are obtained:—(1) series; (2) series weak field; (3) parallel; and (4) parallel weak field.

Control System

Field-weakening is obtained by means of inductive shunts. The control equipment consists of a Jeumont-Heidmann servo-operated camshaft incorporating all the contactors except the line switches. The camshaft contactors are opened by springs and closed by the pressure of a cam on a small roller attached to the operating arm of each contactor. All the cams are mounted on a single shaft.

The Jeumont-Heidmann controller incorporates the following contactors:

(*a*) The resistance notching contactors, which break negligible power or none at all and are therefore fitted with light-duty blow-out coils and small arc chutes.

(*b*) The transition contactors.

(*c*) The field-weakening contactors controlling the inductive shunts across the motor field coils.

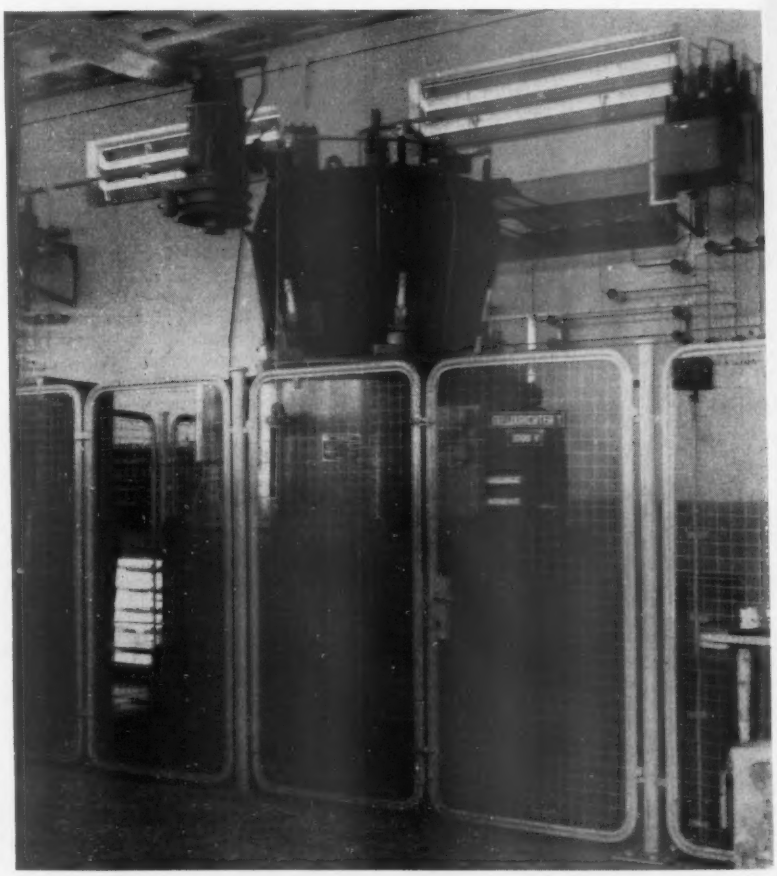
Some of the contactors mentioned under (*b*) and (*c*) handle power and are equipped with appropriately-dimensioned blow-out coils and arc chutes.

The traction motors are axle-hung, self-ventilated machines which take in air through ducts from filters in the roof.

Auxiliary equipment is also designed for dual-voltage operation. It comprises:—

1. A combined motor-generator-compressor set for control and auxiliary supplies, battery-charging and air services, in which the compressor and generator are driven by the same motor. The latter consists in effect of two

(*Continued on page* 251)



Rectifier equipment at Ekeren substation

Rectifier Locomotives for the Virginian Railway

Designed for hauling heavy loads at low speeds on a low-frequency a.c. system

Virginian Railway 3,300-*h.p. Co-Co rectifier locomotive*

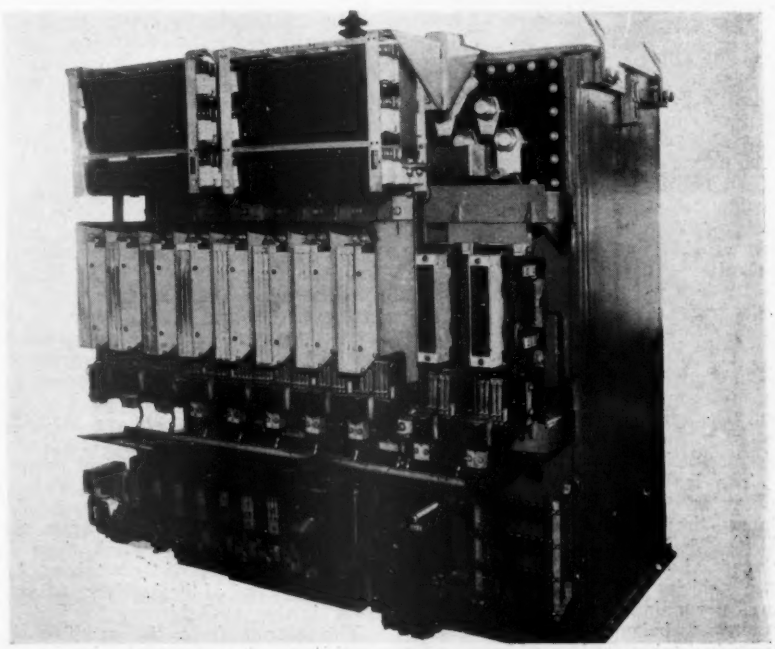
THE electrified section of the Virginian Railway extends over the 134 miles from Mullens to Roanoke, crossing the Alleghenny Mountains and a part of the Appalachians, and reaching a maximum height above sea level of 2,526 ft. at Clark's Gap. Some 8,000,000 tons of coal a year which have passed over this route are handled at Norfolk, Virginia. On leaving Mullens, the trains are faced with a continuous climb of 15 miles to Clark's Gap Siding, beginning with five miles at 1 in 83 and continuing at 1 in 48, with 12-deg. curves throughout. Empty trains in the reverse direction negotiate a continuous ascent of 35 miles to Merrimac, mostly at 1 in 100 but steepening to 1 in 66 for the last 7·4 miles. There are further long adverse gradients in this direction of running on the 18 miles from Rich Creek Siding to Princeton, beginning at 1 in 125 and rising over the last 11 miles at 1 in 66.

The line is electrified with single-phase a.c. at 11,000 V., 25 cycles, but the heavy, low-speed haulage required has resulted in the use of converter locomotives of various types since the electrification was inaugurated in 1926. Originally the split-phase system was used, the locomotives being powered by three-phase induction motors driving through jackshafts and side rods. In 1948 the line received its first a.c./d.c. locomotives, four twin-unit machines with motor-generators being supplied by the General Electric Company of America (described in our issue of September 9, 1949). Recent months have seen the introduction of 12 new a.c./d.c. locomotives, again built by General Electric, in which the d.c. is taken from ignitron rectifiers.

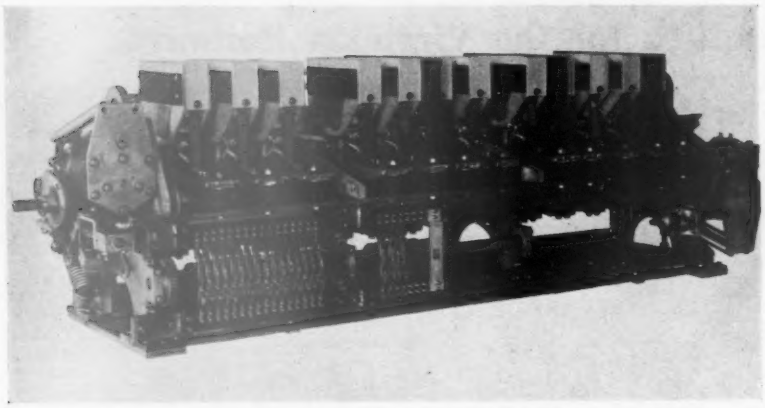
The new Co-Co rectifier locomotives are rated continuously at 3,300 h.p. and will exert a continuous tractive effort of 79,500 lb. at 15·75 m.p.h. Two units operating in multiple, coupled back-to-back, will haul a 3,000-ton train up the 1 in 48 gradient eastbound to Clark's Gap at 16.6 m.p.h., and for the rest of the run to Roanoke will handle 9,000 tons against the ruling gradient of 1 in 172. Trains of empties westbound to Mullens are made up to 3,844 tons and hauled by two locomotives.

Layout of Equipment

Although somewhat similar in their electrical scheme to the General Electric rectifier locomotives for the New York, New Haven & Hartford Railroad (see *The Railway Gazette* of December 23, 1955), the Virginian Railway locomotives are a general purpose design for shunting as well as main-line running and consequently resemble the usual form of single-cab diesel-electric locomotive in the U.S.A. The cab extends the full width of the frames so as to afford a good view in both directions, unobstructed by the narrower front and rear bonnets under which most of the electrical equipment is housed. At the end which is normally leading, the bonnet is shorter and contains the motor-generator set, air-brake equipment, hand brake, and miscellaneous items. All the major items of electrical equipment are under the longer bonnet



Top-changing contactors mounted on main transformer tank



Camshaft controller for accelerating resistances in motor circuits

at the rear end of the locomotive. Resistances for dynamic braking and acceleration control are mounted above the rectifier and control compartment in the rear bonnet. Weight in working order is 176 tons and the overall length 69 ft. 6 in.

The locomotive frame is fabricated from steel plate and sections by electric welding. At each end it extends to within 5 in. of rail level and is strongly braced as a precaution against damage and possible derailment by rock slides in the mountainous territory where the locomotives operate. The two three-axle bogies are side-equalised and have cast steel frames with rigid bolsters. Renewable manganese steel guides are provided for the roller-bearing axleboxes. Bogie wheelbase is 13 ft. and the distance between pivots 45 ft.

Main Power Circuits

Tappings on the main transformer feed a variable voltage to 12 ignitron rectifiers, connected in a bridge circuit with four groups of three rectifiers in parallel. The main transformer is rated at 4,300 kVA. and is tapped on the secondary winding at 2,158, 1,766, 1,439, 1,112, and 785 V. An auxiliary notching transformer is contained in the same tank, its purpose being to assist or oppose the main secondary voltage on any notch and so provide fine gradation of tractive effort. A centre-tapped auxiliary secondary winding is also provided on the main transformer for supplying power to machines and to the primary of the auxiliary notching transformer. Tap-changing is carried out by individual contactors, which are mounted on the outside of the transformer tank so as to form a single combined transformer and control unit.

The ignitron rectifier tubes have a diameter of 12 in., which is slightly larger than in the New York, New Haven & Hartford locomotives mentioned above. They are housed in two cubicles accessible from the locomotive running plate. Four iron-core reactors to balance the current between individual tubes are located between the cubicles and may be lifted out of the locomotive through an overhead hatch. Also included in the rectifier compartment are a water pump and temperature-regulating system to maintain the operating temperature of the rectifiers within the correct values. A three-way regulating valve ensures that the water temperature is closely controlled at approximately 43°C. The rectifier coolant is cooled by a water-to-air heat exchanger in the main equipment blower compartment. This is a two-stage, axial-flow blower which draws air in through screens near the roof and forces it down, through the water radiator, to a duct in the floor through which it is distributed to the transformer, rectifiers, reactors, and traction motors. The blower rating is 35,400 cu. ft. per min.

Arc-back protection for the rectifiers is provided by a circuit-breaker controlled by current transformers which carry the rectifier current in single-turn primaries and a d.c. saturating current in their secondaries. When rectifier current is flowing in the normal direction, it produces little change in flux because of the saturation of the core by the secondary. A reversal of flow, however, tends to reduce the core flux to zero and drive it to saturation in the opposite direction, and this large change in flux induces a voltage in the secondary which operates the trip coil of the circuit-breaker. A Thyrite resistor across the secondary of each current transformer tends to make the secondary voltage pulse of constant amplitude and duration irrespective of the position of the locomotive on the power system when an arc-back occurs.

On the occurrence of an arc-back, the voltage pulse is used also to charge a resistance-capacitor system across each current transformer secondary, the discharge of which provides a pulse of sufficient duration to operate the arc-back counters, of which there is one for each group of three tubes. An accurate record of the incidence of arc-backs is thus available.

The output from the rectifiers is applied to three parallel circuits of two traction motors in series, each circuit including an identical notching resistance. The motors are of a type widely used in diesel-electric locomotives but modified for further protection against flashover. During acceleration the resistances are short-circuited in steps by a single camshaft controller. The control system therefore combines tap-changing with resistance notching, the two together providing 17 basic steps, on any of which further fine control is available by means of the auxiliary notching transformer with its buck-and-boost connections. During resistance changes the inductance of the smoothing reactor tends to maintain the motor current at its initial value, so that torque fluctuations are reduced to a minimum. A proportion of resistance notching, as in this scheme, enables the desired speed/current characteristic to be maintained at low motor voltages without using an inconveniently large number of tap-changes.

By interconnecting the mid-points of the three two-motor circuits, a tendency to arrest slipping is obtained similar to that which characterises the full-parallel arrangement. Automatic wheel-slip protection is also incorporated. A conventional d.c. relay system would require elaborate filtering arrangements to reject the ripple component in the traction motor current. In the present scheme, therefore, a saturable reactor is used to compare the motor voltages or currents. Control windings on the reactor reflect the motor armature voltage, and are proportioned so that when the voltages across all motor armatures are balanced there is virtually no flow of a.c. through the main reactor winding. If this balance

One of the 12-in. dia. ignitron rectifier tubes

is disturbed, the current flow increases and is rectified, the d.c. being applied to a magnetic amplifier which provides sufficient output to operate the relay controlling the wheel-slip warning light and buzzer, with a time-delay relay which cuts off power when necessary.

For dynamic braking a portion of the notching resistances is connected across the traction motor armatures and the motor fields are all connected in series across the rectifier output. In these conditions the rectifier excitation is taken from the auxiliary notching transformer, which provides a maximum of 95 V. and is controlled by means of resistances and contactors in the auxiliary transformer primary circuit which provide 17 braking steps. These are selected by a separate braking handle on the master controller. During motoring and braking, the motor circuit resistances are cooled by their own blowers.

The auxiliary machines comprise the main equipment blower motor, compressor motor, Pyranol pump motor (for transformer cooling), water pump motor (for rectifier cooling) and the motor-generator set. All are driven by single-phase, 25-cycle induction motors connected to the 195-V. output from the auxiliary transformer. Split-phase starting in conjunction with a series resistance in the starting winding circuit is used, and elimination of the starting winding and resistance is effected by a relay when the motor is at full speed.

The electrical system has been described in a paper to the American Institute of Electrical Engineers earlier this year by Mr. J. C. Brown, of the General Electric Company of America. Its introduction was also made the occasion of a paper submitted to the A.I.E.E. Committee on Land Transportation by Mr. J. C. Fox, of the Virginian Railway, and Mr. J. P. Wiles, of the General Electric Company.

Electric Traction from Amsterdam to Brussels

(*Concluded from page* 248)

motors on the same shaft, which are connected in parallel on 1,500 V. and in series on 3,000 V. The generator is a d.c. shunt machine with an output of 10·5 kW. at 100 V. The two-stage compressor gives a pressure of 10 atm.

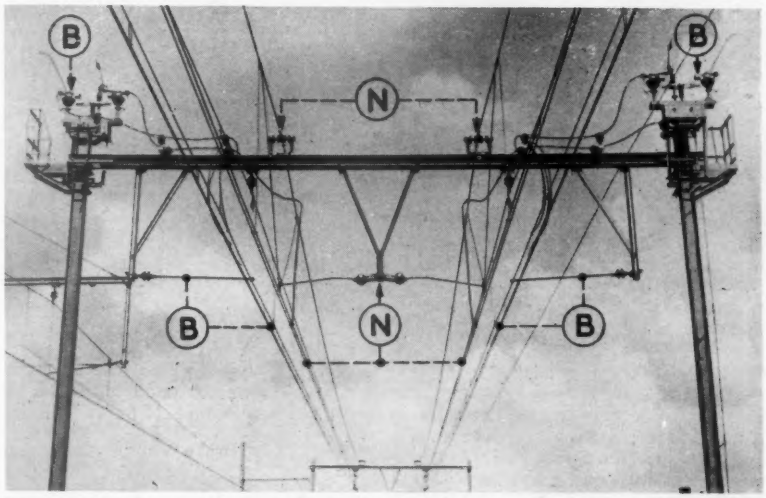
2. Electric heating in the carriages.

Pantographs

In Belgium the overhead line is higher in some places than in Holland, but it was impossible to use a Netherlands Railways pantograph adapted for the extra height since it would have come into contact with the underside of bridges where the catenary is interrupted. It was therefore decided to fit two pantographs on each motor coach, one for use only in Belgium and the other only in Holland. Suitable interlocks are provided in the low-tension circuits of the electro-pneumatic pantograph operating system to ensure that only the appropriate pantograph can be raised.

A special interlocking system was designed in connection with the line-voltage selector switch. Each line-voltage relay, one for 1,500 and one for 3,000 V., has auxiliary contacts through which two secondary relays governing the control circuits of the whole installation are operated. Interlocks ensure that when the switch is in the 3,000 V. position and the 3,000 V. relay is operated, only the corresponding control relay can be energised and that no operation ensues unless the voltage-selector switch is in the position corresponding to the actual line voltage. The 3,000-V. and 1,500-V. relays will operate at 2,000 V. and 1,000 V. respectively.

Warning post for voltage changeover



Details of Belgian (B) and Netherlands (N) catenary systems at frontier overlap span

The requirement of working in conjunction with Netherlands Railways rolling stock governed the design of the control circuits. These circuits are in three groups:—

(*a*) Circuits confined to the new rolling stock.

(*b*) Train lines serving all vehicles in any combination of rolling stock, for controlling traction motors, pantographs, etc. All these functions must be controlled in the same manner as in existing stock. The relative connections are made through the existing control contacts on the automatic couplers.

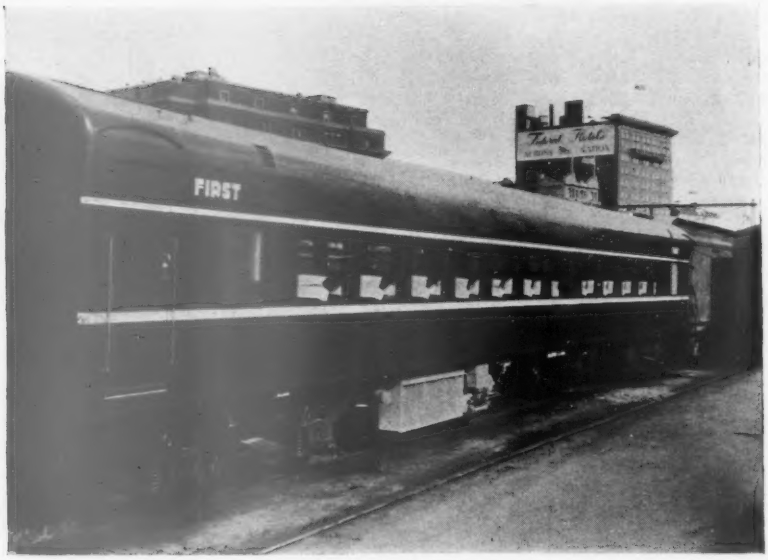
(*c*) Train lines for control functions which are not used in Netherlands Railways stock and are peculiar to the new train sets, such as operation and indication of the voltage-selector switch, selection of pantographs, control of automatic doors, etc. For this purpose special contacts have been added to the automatic couplers.

When one of these trains is running from Roosendaal to Essen, the Netherlands Railways pantograph must be lowered approximately 218 yd. before the point of separation between the two voltage systems. This is followed immediately by changing over the voltage-selector switch to 3,000 V., while the train is still under the 1,500 V. contact wire. When the whole train is under the 3,000 V. contact wire, the Belgian pantographs may be raised, after which power may be restored to the motors. Indicator boards are installed at the lineside at appropriate points.

In the opposite direction (Essen-Roosendaal) the corresponding operations are carried out in the same sequence except that the change-over of the voltage-selector switch is not made until the train is under the 1,500 V. contact wire.

Rolling Stock for Victorian Railways

Open coaches for Melbourne-Sydney "Daylight Express": passenger and freight brake vans



First class open coach running in the "Daylight Express"

THE open coaches running in the Victorian Railways "Daylight Express," between Melbourne and Albury, where passengers change into and from the New South Wales Government Railways train to and from Sydney (the whole journey being now performed in a day) were built in the Victorian Railways Newport Works. Previously the passenger coaches in this train had been of the single compartment type. The new coaches are known as the "Z" class, first class as "AZ" and second class as "BZ". They are all-steel and air-conditioned.

Seating in Open Saloons

The first class are fitted with 48 reclining and rotating seats and the second class with 64 in the two saloons of which they are composed. Seats are arranged in pairs on each side of a centre aisle and are numbered 1 to 20 in the smoking section and 21 to 48 in the non-smoking section of the first-class saloons and 1 to 24 and 25 to 64 in the second class vehicles.

Both "AZ" and "BZ" vehicles are fitted with automatic couplings and the overall length of both classes is 74 ft. 8 in. over the coupling points. Both have tonnage rating of 50 and are mounted on two four-wheel bogies.

Drinking fountains equipped with paper cup dispensers are provided at end vestibules. Paper towel dispensers are also fitted. A public address system is installed. Seats are adjusted to face the locomotive on each journey. Heating is provided by floor-level radiators in winter. Other features are fluorescent lighting, leather upholstery and ribbon walnut panelling. The external livery is blue, with gold lining.

Brake Vans

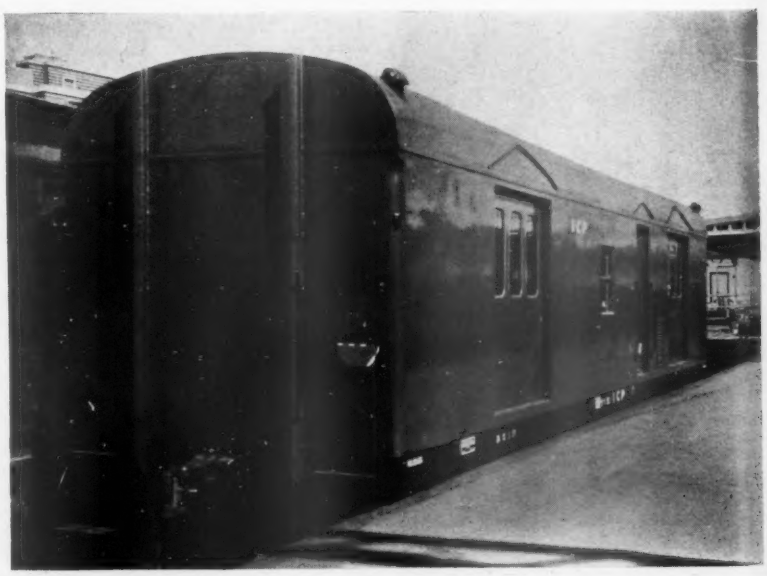
Bogie passenger and freight brake vans were recently delivered. They were built by A. E. Goodwin Limited, of Sydney. The new type is known as the "CP" class.

Bodies are all-steel, with timber linings. Externally vans are painted red. They are mounted on two four-wheel bogies equipped with roller bearings. Couplings are of the automatic draft gear type. The vehicles are not equipped with buffers.

Principal dimensions are:—

Length over coupling points	41 ft. 11½ in.
Length	38 ft. 4½ in.
Width	8 ft. 7½ in.
Tare weight	26 tons 14 cwt.
Tonnage rating	35 tons
Capacity	10 tons

The central guard's compartment, 8 ft. 9 in. long, is fitted with guard's seat, desk, two periscopes and mirrors, lavatory accommodation with pressure water supply to pan and basin, fuel bin, stove, value parcels and electrical lockers, letter rack, guard's cock and gauge, fire extinguishers and breakdown kit, etc. The two freight and baggage compartments are fitted with both fixed and movable shelves, dog boxes and padded passenger seats. Tail disc bracket and lamp brackets are fitted. The vans are electrically lighted from a belt-driven generator.



All-steel brake van; note coupling and type of sliding door

REDUCED STERLING COST OF S.N.C.F. TICKETS.—The French Railways have announced that because of the new rate of exchange for French francs, the sterling cost of S.N.C.F. internal tickets issued in the United Kingdom has been reduced. The second class tourist return fare from Paris to Nice, as an example, has been reduced from £9 19s. to £8 7s., and the first class fare from £13 18s. to £11 13s. The sterling charge for through tickets from the United Kingdom, seat reservations, and couchette supplements remain unchanged until further notice.

RAILWAY NEWS SECTION

PERSONAL

Mr. S. Williams, Signal Engineer, London Midland Region, British Railways, is retiring tomorrow, August 31, after 51½ years of service.

Mr. E. G. Marsden, O.B.E., Chief Officer (General Duties), British Transport Commission, who, as recorded in our July 26 issue, has been appointed Secretary, British Road Services, joined the North Eastern Railway in 1921. On conclusion of training as a traffic apprentice he had experience in the commercial and operating departments of the Scottish and the North Eastern Areas of the London & North Eastern Railway, and was appointed to the staff of the Passenger Manager, York, in 1932. He became Assistant Industrial Agent at Kings Cross in 1934 and was a member of the Standing Joint Committee of Railway Air Services Limited from 1934 to 1937. In September, 1938, Mr. Marsden was seconded for work with the Railway Executive-Committee on its formation as an advisory body, and, on the formal constitution of the Committee on September 1, 1939, he acted as principal assistant to the Secretary until appointed Secretary in April, 1945. He became Secretary of the Railway Executive on January 1, 1948.

Mr. E. W. Rostern, Chief Officer for Special Duties, British Transport Commission is to retire on September 6.

Mr. J. A. de Wet, a relieving System Manager at Railway Headquarters, Johannesburg, South African Railways, has been appointed System Manager, Cape Eastern System, East London. He succeeds Mr. J. Meiring Vlok who has been appointed System Manager, Port Elizabeth.

Mr. V. H. F. Hopkins has been appointed Manager of Engineering, Diesel Engine Division, English Electric Co. Ltd.

Mr. S. McMahon has been elected President of the Canadian Pacific Express Company.

Mr. C. G. Reddington, District Engineer, Kings Cross, Eastern Region, British Railways, has been appointed Planning Officer (Kings Cross), in the office of the General Manager, Eastern Region, Liverpool Street.

Monsieur P. C. Tharlet, President of the International Congress on Combustion Engines, who, for reasons of ill health, is relinquishing that position, will not sever his connections with that body, since he has been nominated Honorary Founder-President by the permanent committee. After obtaining the engineering diploma of the École Supérieure de Physique et de Chimie Industrielle of Paris, Monsieur Tharlet took a practical course in a machine tool works to familiarise himself with everyday problems in mechanical engineering. The first engineering appointment he held was with the Société Alsacienne de Constructions Mécaniques of Belfort, Mulhouse and Graffenstaden. After the 1914-18 war he joined the Sulzer undertaking, with which he has since remained, being successively an engineer, Chief Engineer, and Manager, concerned more especially with diesel engines, boilers, steam machinery and associated equipment, and compressors for industrial purposes. From 1919 he placed the benefit of his knowledge and judgment at the disposal of the various fuel users who, at that time, were sponsoring the use of diesel engines. In 1930 an association of manufacturers of internal combustion engines was formed and he rendered similar services to that body. After occupying the Presidency of the Central Technical Commission from 1940 to 1944, concerned with organising the use of thermal hydraulic and pneumatic appliances, and equipment, the French manufacturers of internal combustion engines invited him to put his services at the disposal of that section of industry and he has since been continuously confirmed in the office of President of their body. At the conclusion of the 1939-45 war, Monsieur Tharlet laid the foundations of the International Congress on Combustion Engines, and directed the holding of its first session in Paris in 1951. A director of the Federation of Mechanical Engineering Undertakings, he is also a member of the Executive Committee of the Association of Shipyards & Marine Engine Builders. He was made an Officer of the Legion of Honour in 1953.

Mr. E. G. Marsden
Who has been appointed Secretary of British Road Services

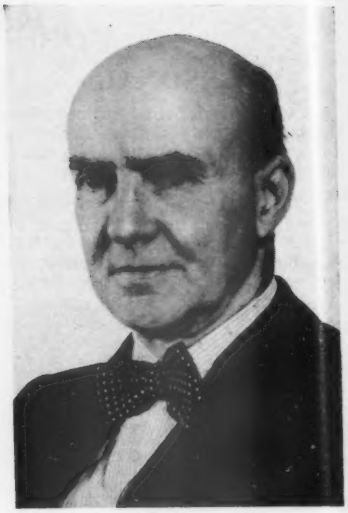
Monsieur P. C. Tharlet
Nominated Honorary Founder-President of the International Congress on Combustion Engines

Mr. W. O. Reynolds

Appointed Assistant (Passenger Services), Euston, London Midland Region

Mr. C. R. Bennett

Appointed Assistant (Modernisation), Euston, London Midland Region



The late Mr. Leslie Flatt

Technical Consultant to the United Steel Companies Limited

Mr. W. O. Reynolds, Assistant (Freight Services), Chief Operating Superintendent's Office, London Midland Region, British Railways, who, as recorded in our August 2 issue, has been appointed Assistant (Passenger Services), Euston, began his railway career on the former L.N.E.R. in 1933. He was appointed a Traffic Apprentice in 1936, and, at the conclusion of his training in 1939, was appointed Assistant to the District Superintendent, Manchester. The following year Mr. Reynolds joined the Royal Engineers. He was demobilised in 1946 with the rank of Lt.-Colonel, awarded the M.B.E., and twice Mentioned in Dispatches. He was appointed Assistant to the District Superintendent, Stratford, in 1946 and moved to a similar position at Doncaster the following year. He became Assistant District Superintendent, Lincoln, in 1948, and was appointed Assistant District Operating Superintendent, Nottingham, in December of the same year. In 1949 Mr. Reynolds became Assistant District Operating Superintendent, Doncaster, and, in 1952, District Operating Superintendent, Fenchurch Street. He was appointed District Operating Superintendent, Leeds City, in February, 1954, and in January, 1956, Assistant (Freight Services), Chief Operating Superintendent's Office.

Mr. L. C. Lloyd has been appointed Assistant Works Superintendent (Aldenham), in the department of the Chief Mechanical Engineer (Road Services), London Transport Executive.

We regret to record the death on August 25, at the age of 84, of Sir Cyril Kirkpatrick, formerly Chief Engineer to the Port of London Authority.

Metropolitan-Vickers Electrical Co. Ltd. has announced that Mr. B. G. Churcher has relinquished his position as Manager of the Research Department, but will continue to act in an advisory capacity. Dr. J. M. Dodds has been appointed Manager of the Research Department. Mr. H. C. Young relinquishes his duties as Superintendent, Erection Department, but remains in the service of the Company as Consulting Engineer. His services will be available for commercial and engineering purposes as required. Mr. A. P. Mitchell has been appointed Superintendent, Erection Department, Mr. W. Harper, Assistant Superintendent (Switchgear), Erection Department, and Mr. A. D. Millar, Assistant Superintendent (Plant), Erection Department.

Mr. P. O'B. Hove has been appointed Resident Manager, Middle East, for Metropolitan-Vickers Electrical Export Co. Ltd. He will be located in Baghdad, Iraq.

Mr. C. R. Bennett, District Operating Superintendent, Liverpool Central, London Midland Region, British Railways, who, as recorded in our August 2 issue, has been appointed Assistant (Modernisation), Euston, (located Crewe), was educated at Palmers School, Grays, and entered the service of the L.M.S. Railway as a junior clerk at Tilbury Dock station in 1923. After a number of years' experience at passenger and goods stations, he moved to the London District Passenger Manager's Office and, in 1932, to the Chief Operating Manager's Office at Euston. Mr. Bennett continued for twelve years in passenger and freight sections of the L.M.S. Operating Headquarters and, in 1944, he was posted to Birmingham (Saltley) as District Inspector. In 1945 he went to Peterborough as Assistant District Controller, the following year was appointed Assistant to the District Operating Manager at Gloucester, and, in 1948, to a similar position at Liverpool Lime Street. On the incorporation of the Cheshire Lines Committee into the Western Division of the L.M.R. at the end of 1948, Mr. Bennett became the first Assistant District Operating Superintendent at Liverpool Central, and in March, 1952, was appointed Assistant District Operating Superintendent at Euston. In 1954 he returned to Liverpool as District Operating Superintendent, Liverpool Central, the position he now leaves to take up his new appointment.

Mr. H. E. Cornish, former Post Master General of Sarawak, has been appointed General Manager of British Telecommunications Research Limited, the research establishment jointly sponsored by Automatic Telephone & Electric Co. Ltd., and British Insulated Callender's Cables Limited, at Taplow, Bucks.

The late Mr. Leslie Flatt, C.I.E., V.D., B.Sc. (Eng.) (London), M.I.C.E., M.I.Mech.E., M.I.Loco.E., whose death was briefly recorded in our August 23 issue, commenced his engineering training in 1906 in the G.E.R. workshops at Stratford. He resigned from the G.E.R. and in 1913 joined the East Indian Railway. He was released for military duty in 1916 and served with the R.E. as Captain until October, 1918, and was mentioned in despatches twice. On returning to railway duty he was posted as Works Manager, E.I.R., Jamalpur. In 1920 he transferred to the Great Indian Peninsula Railway to re-organise its locomotive workshops at Parel, Bombay, and from 1923 carried out a re-organisation of the carriage and wagon workshops, later becoming Carriage & Wagon Superintendent, and then Deputy Chief Mechanical Engineer, until his transfer in 1927 to the Eastern Bengal Railway as Deputy Chief Mechanical Engineer (Running), on which railway he subsequently became Chief Mechanical Engineer. In 1936 Mr. Flatt went to the North Western Railway as Chief Mechanical Engineer, but in 1939 was seconded to the Indian Stores Department as Deputy Chief Controller (Engineering). With the creation, later, of a Supply Department, he became Director of Engineering. In June, 1940, he was recalled to the Railway Department, to become Director, Mechanical Engineering, Railway Board, and in 1944 took over as Chief Controller of Standardisation, from which post he proceeded on two years' leave, preparatory to retirement, in April, 1945. On his return to England he was permitted by the Government of India to become Technical Adviser in London to the Tata Locomotive Engineering Co. Ltd. for the development of locomotive manufacture in the workshops at Tatanagar, acquired from the former East Indian Railway. In 1947 he retired from Indian Government Railways service, and in 1951 was appointed Technical Consultant to the United Steel Companies Limited.

Mr. Charles E. Martin has been appointed General Service Manager & Member of the Executive Committee of the Cummins Engine Company, Inc., U.S.A.

Mr. H. J. Thompson

Appointed Chairman of the Creative Tourist Agents' Conference

Mr. W. D. Dickie

Appointed Assistant Chief, Motive Power & Rolling Stock, C.P.R.

Mr. C. W. Parker

Appointed Chief Mechanical Engineer Canadian Pacific Railway

Mr. H. J. Thompson, Inclusive Traffic Manager, Thos. Cook & Son Ltd., who, as recorded in our July 19 issue, has been appointed Chairman of the Creative Tourist Agents' Conference, was born in 1898 and joined Thos. Cook & Son Ltd. in 1913 in the Shipping & Forwarding Department. He served in the army throughout the 1914-18 war as a dispatch rider and rejoined Thos. Cook & Son Ltd. in 1919. In October, 1938, he was appointed Chief Clerk, Popular Tours, and in May, 1946, Manager, Holiday Tours. He became Manager, Inclusive Traffic, in December, 1946. Mr. Thompson has been Chairman of the Tour Planning Sub-Committee of the C.T.A.C. for a number of years, and was awarded the M.B.E. in 1955 for his services to international tourism. He was recently appointed Inclusive Traffic Manager of Thos. Cook & Son Ltd., in which capacity he became a member of the General Management.

Mr. B. B. Woodland, who, as recorded in our August 2 issue, has been appointed Assistant Engineer of Motive Power, Canadian Pacific Railway, joined the company in 1930, as a chainman in construction work at Debden, and became an electrician apprentice at the company's shops at Winnipeg in 1931. Upon completion of his apprenticeship in 1938 he moved to Calgary where he served as an electrician at Alyth Shops, later becoming District Electrician of the Alberta District, Road Electrician of the Alberta District, and District Electrical Foreman at Moose Jaw. In 1949 he became Supervisor of Internal Combustion Equipment & General Inspector of Diesel Equipment, with jurisdiction over the diesel operations in western Canada. In 1955 he became Division Master Mechanic at Winnipeg covering the Winnipeg terminals and the Portage Division.

Mr. G. M. Wolfe, Joint Managing Director of Wolf Electric Tools Limited, leaves in mid-September on a three months global business tour embracing Canada, New Zealand, Australia, Malaya, Thailand and India.

Mr. R. C. Crouch has been appointed Superintendent, Railway Lubricants, Regent Oil Co. Ltd.

Mr. Hendrie Oakshott, Treasurer of the Household, and a Government Whip, is visiting South Africa in September to represent the United Kingdom Government during the British Trade Weeks which will take place in Johannesburg from September 16 to September 28.

Mr. W. D. Dickie, Works Manager, Angus Shops, Canadian Pacific Railway, who, as recorded in our July 26 issue, has been appointed Assistant Chief of Motive Power & Rolling Stock, was born and educated in Montreal, and joined the C.P.R. in 1915 as an apprentice at Glen Yard, Montreal. In 1918 he joined the First Tank Battalion for overseas service in the 1914-18 war, and in 1919 rejoined the railway as a machinist apprentice at Winnipeg. He was appointed Assistant Chief Draughtsman in 1933, and in 1934 Chief Draughtsman. In 1936 he became General Locomotive Foreman at Moose Jaw, and in 1937 Division Master Mechanic, Calgary. During the 1939-45 war Mr. Dickie was Supervisor of Machinery for the large munitions contracts undertaken by the Canadian Pacific Railways in its main shops throughout Canada. In 1945 he became General Supervisor of Machinery in the Motive Power Department at Montreal, and in 1948 was appointed Assistant Works Manager (Locomotive) at Angus Shops. His appointment as Works Manager came in 1951.

Mr. H. R. Carver, Technical & Sales Director of Jonas Woodhead & Sons Ltd., has recently returned from a tour of the Scandinavian countries, during which time he visited customers, agents, and contacts in Norway, Sweden, Finland, Denmark, and Holland.

British Railways, London Midland Region, have announced the following appointments:

Mr. E. G. Brentnall, Assistant Signal Engineering Officer, British Transport Commission to be Signal Engineer, London Midland Region.

Mr. A. J. Johnson, District Commercial Manager, Stoke, to be Assistant Operating Officer, Euston.

Mr. J. G. Aston, Assistant Divisional Operating Superintendent, Derby, to be Assistant Operating Officer, Euston.

Mr. C. W. Parker, who, as recorded in our July 26 issue, has been appointed Chief Mechanical Engineer, Canadian Pacific Railway, worked his way through the Revelstoke shops as a machinist apprentice while he attended the University of British Columbia at Vancouver from which he was an honour graduate in mechanical engineering in 1941. From 1945 until 1951, he was engaged with the Research Department on technical studies including aspects of nuclear energy. He joined the Motive Power Department in 1951 as Special Engineer, the position he now vacates to take up his new appointment.

Mr. R. M. Van Dyck, Export Manager of Trico-Folberth Limited, has recently returned from a world business tour of agents and customers.

Mr. D. F. Haney, who, as recorded in our August 2 issue, has been appointed Engineer of Standards & Methods, Canadian Pacific Railway, was born in Revelstoke, B.C., and entered the C.P.R. in 1939. In 1947 he joined the Department of Research in Montreal as a Junior Research Assistant and in 1949 was transferred to the office of the Chief of Motive Power & Rolling Stock, as Assistant Engineer of Diesel Equipment, retaining the position until his present appointment.

We regret to record the death on August 26 of Lt.-Colonel E. W. Slaughter, C.B.E., Managing Director of the Nizam's State Railways from 1941 until 1946 and London Agent for that system, 1946-48.

Mr. Keith Campbell, who, as recorded in our August 9 issue, has been appointed Assistant Manager, Labour Relations, Canadian Pacific Railway, was born in Toronto, and joined the company in 1935, in the dining car & accounting departments. He served with the Toronto Scottish Regiment during the 1939-45 war, and returned to the company to be appointed an Operating Assistant. He became a Special Representative of the Vice-President, Eastern Region, in Toronto in 1949, and an Assistant to the Vice-President there in 1954. He was appointed Assistant to the Manager of Labour Relations, Montreal in 1956.

NEW EQUIPMENT AND PROCESSES

Resistant Protective Clothing

P.V.C. waterproof clothing in matt black finish, made from plastic-coated, fully-impregnated cloth with a soft finish, is resistant to acids, oils, and most chemicals, and unaffected by extremes of temperature.

The manufacturers of Jeltek clothing claim that it will not crack, peel or stick when folded, thus adding considerably to their shelf life. All seams are sewn and electronically welded for absolute protection, whilst an additional feature is the all-plastic buttons permanently welded on to the garment. The clothing (except for the sou'wester) is also available with a bonded fleecy lining giving a thick, woolly texture inside. This, the makers claim, entirely eliminates condensation problems and, in addition, enables the wearer to work in cold as well as in wet weather conditions.

Delivery is ex-stock. Prices and other details may be obtained from the manufacturer, J. E. Lesser & Sons Limited, Green Lane, Hounslow, Middlesex.

Two-way Rail Benders

A DEVELOPMENT in manually-operated rail bending machines is represented by the recently introduced CS series. These have a two-way action which is suitable for working in restricted spaces or on electrified track with outside conductor rails.

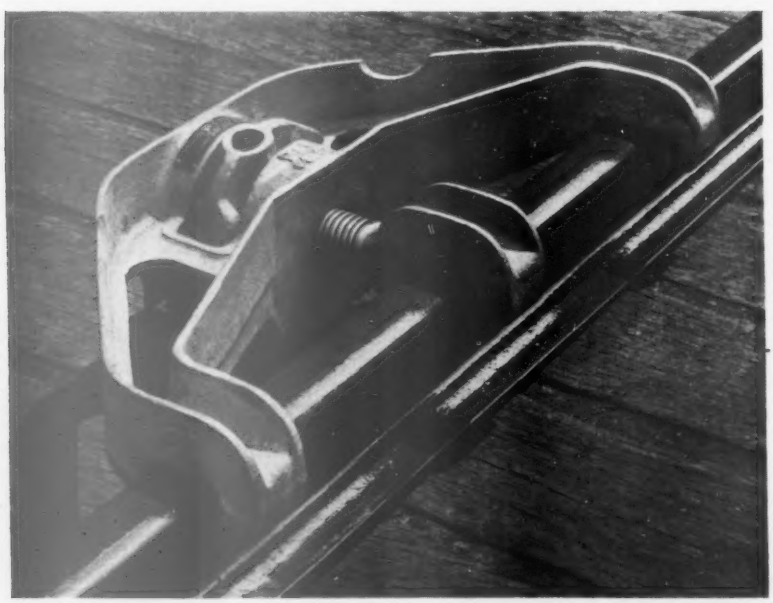
Two models are at present available, the CS.100 which is suitable for dealing with all rail sections up to 110 lb. per yd. f.b. and the CS.80 for all f.b. rails up to 80 lb. per yd. and the heaviest b.h. sections.

Made of high tensile cast steel and employing girder-type construction, these benders are stated to be stronger and lighter than earlier types. The CS.100, which is illustrated, weighs 220 lb. and the CS.80, 140 lb.

The centrally located capstan nut by which the centre claw is operated, enables rails to be bent in either direction from one setting of the appliance. The thrust load is taken on massive roller bearings housed inside the main casting one on either side of the capstan nut. A further advantage of the two-way feature is the ability to correct over-bending without the necessity of reversing and re-setting the bender.

Because of the roller bearings, the effort required to bend a rail is less than with other types of manually operated benders and the operation can be more accurately controlled. Each bender is supplied complete with a 6-ft. long high tensile steel operating lever.

Full details, including price and delivery, may be obtained from the manufacturer, the P. & M. Co. (England) Ltd., la, Grosvenor Gardens, London, S.W.1.



Lightweight Safety Eyeshield

A LIGHTWEIGHT eyeshield, the Itex No. 939, has been designed to offer maximum protection to the wearer but weighs only 1 oz.

The lens has been specially curved to offer protection from front and side view. The unique design does away with the use of sideshields, thereby enabling better vision. The lens is replaceable by means of a screw-in attachment at the side of the frame; it is also fitted with a nosepiece for additional comfort. The plastic sidearms have been reinforced by means of a metal strip through the centre and these may be adjusted to suit individual requirements.

During the past two years the manufacturer has made an analysis of workers' complaints regarding safety goggles and has found the four major complaints to be: lack of vision, heavy and cumbersome, uncomfortable to wear, and misting of lens. The Itex No. 939 has been designed to overcome these complaints. Samples and quotations will be sent on application to the manufacturer and supplier, the Safety Service Company, 34a, Stonebridge Park, London, N.W.10. Delivery can be effected immediately from stock.

Open-flat Binder

A TELESCOPIC post binder, known as the Albion, allows its contents to be opened flat, which makes it particularly suitable for contract specifications, technical manuals, and other publications used in works; because it opens flat, speedy reference can be made to the contents, an

advantage on the workshop floor. It will take publications of various thicknesses and hold all firmly, without excess bulk.

The mechanism incorporates free-acting telescopic posts, which penetrate through perforations in the sheets of the publication. The posts are automatically extended to their maximum length when the binder is opened; this ensures the sheets lie flat. To enable contents to be changed quickly and to keep sheets under control, a lifter bar is incorporated; it is attached to the "free" ends of the posts. The mechanism is secured by a trigger-operated locking box which engages with the top side of the lifter bar.

The binder may be made with stiff or limp sides, covered in a material selected from a wide range of quality, colour and finish—normal materials are leathercloth or plastics sheeting, lettered in metallic or coloured foil.

There are five standard sizes of binder (ranging from 8½ in. by 5½ in. to 13 in. by 8 in.), and two standard capacities (1½ in.-2¼ in. and 2 in.-2¾ in.). The price varies according to quality, size and quantity ordered, from about 15s. each. The manufacturer is C. Cakebread Limited, Baches Street, London N.1.

Ultrasonic Cleaning Bath

A NEW type of ultrasonic cleaning bath for small components and precision piece parts, the L.276, incorporates a low-frequency radial transducer, which focuses the cavitation intensity in the centre of the cleaning fluid container, where the component would be placed for cleaning.

In addition, the cavitation effect is directed equally to all sides of the component simultaneously. The entire surface area of the article can be cleaned with one dip, and in less than one min., in many cases.

The cleaning effect obtained by applying ultrasonic energy to the cleaning fluid is caused by acceleration given to the particles of the liquid, which then bombard the surface of the component, and the other is the subsidiary pressure effects of cavitation which occur in the liquid during the process.

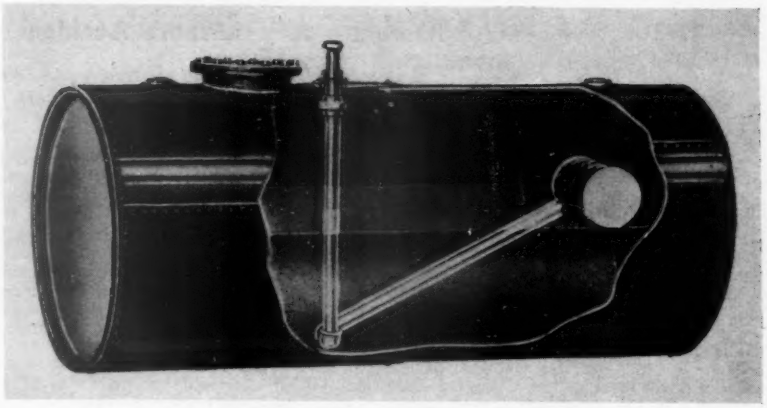
This results in a scrubbing action against any exposed surfaces which gives a far more thorough and rapid cleaning than is attainable by conventional methods.

Hot solvents may be used direct. The fluid container, a standard Pyrex glass beaker, and transducer are contained in a water jacket. The water serves not only to cool the transducer, but also to couple the ultrasonic energy to the cleaning fluid.

The beaker is easily removable, as it simply stands in position in the centre of the transducer annulus; multi-stage processing with a variety of cleaning agents when exceptionally high cleanliness is required can be carried out by simple substitution of beakers. Only the beaker is in direct contact with the fluid; no problems, therefore, arise with the cleaning of the equipment.

Capacity of the beaker is 250 mL., and its dimensions are approximately 2¾ in. dia. by 4½ in. deep. The radial transducer operates at 20 kc/s. The choice of frequency (low as opposed to high) is dictated largely by the nature of the contamination.

Further details may be obtained from the manufacturer, Mullard Limited, Mullard House, Torrington Place, London, W.C.1.

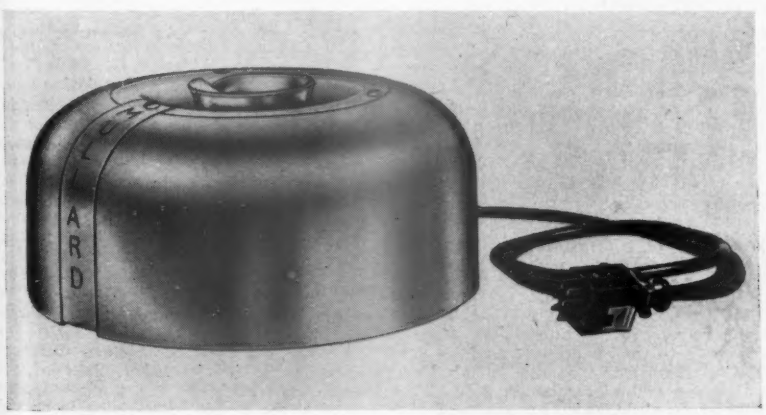


Floating Suction for Liquid Storage

A FLOATING suction fitting, the Bowser Figure 280, is designed for use in diesel fuelling systems and industrial applications where it is necessary to draw clear liquid from the surface instead of from the bottom of the tank. The simple construction and easy operation permits the float to fall and rise as the tank supply is drawn off and replenished.

Installation may be made easily in either above ground or underground tanks equipped with a manhole to provide access for installing. The Figure 280 consists of float, inlet flange, float clamp, swing elbows, and nipples. Internal piping is not furnished standard but can be supplied at extra cost when specified and tank dimensions are furnished. The fitting is available in five standard pipe sizes: 1¼, 1½, 2, 3 and 4 in.

Further details including prices and delivery dates may be obtained from the manufacturer, Liquid Systems Limited, Norwich Union House, Wellesley Road, Croydon.



Primer for Damp Surfaces

A PRIMER for application to moist concrete, asbestos cement, plaster, brickwork and similar surfaces, the Pitan M.C. Primer, contains a chemical which reacts with the moisture; the latter is converted into a harmless liquid which rapidly evaporates from the paint film leaving the surface and paint absolutely dry.

It may be applied over existing paint which has become moist because of contact with water, provided that the existing coating is in good condition and firmly adherent. It will also be found particularly useful when painting concrete, brickwork, asbestos cement roofing, lagging, concrete and similar structures and rendered surfaces of all types which have been unable to dry due to rain. The primer is touch dry in 30 min. and hard dry overnight.

Pitan M.C. Primer is supplied in a light shade of neutral grey and can be supplied for brush or spray application. The coverage depends on the porosity of the surface but, generally speaking, 30-35 sq. yd. per gal., may be assumed for a bare surface of average porosity. On a surface already painted 40-50 sq. yd. per gal. coverage can be expected.

When painting newly rendered surfaces about 10 days should be allowed to elapse before the primer is applied, to permit adequate carbonation and hydration.

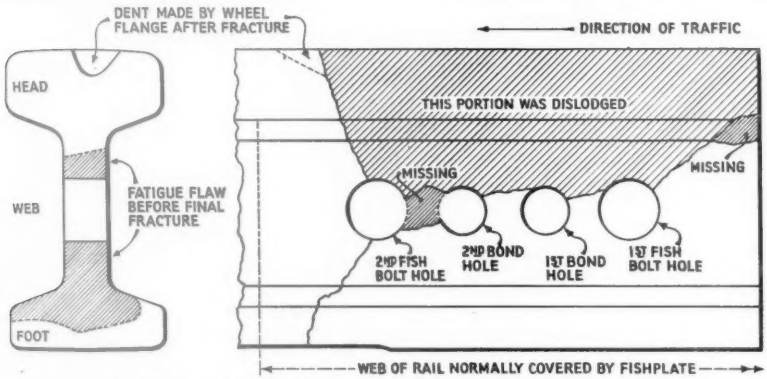
Delivery is ex-stock, and the price is 62s. a gal. The manufacturer is Allweather Paints Limited, 36, Great Queen Street, London, W.C.2.

POLLARD BEARINGS (NORTHAMPTON) LIMITED.—The Hanwell Engineering Co. Ltd., of Countess Road, Northampton, has been taken over by Pollard Bearings Limited, and the title is changed to Pollard Bearings (Northampton) Limited.

Ministry of Transport Accident Report

Between Brookwood and Farnborough, November 22, 1956; British Railways, Southern Region

Colonel W. P. Reed, Inspecting Officer of Railways, Ministry of Transport & Civil Aviation, inquired into the accident which occurred at 6.33 p.m. on November 22, 1956, between Brookwood and Farnborough when the last coach of the 5.37 p.m. electric train, Waterloo to Ascot via Woking, consisting of four two-coach units travelling at a moderate speed on the down local line, became derailed at its leading bogie as it passed over a broken rail end and was just foul of the parallel down through line when the train stopped. In this condition it was grazed by the 6 p.m. steam express, Waterloo to Plymouth, consisting of 11 corridor coaches drawn by a 4-6-2 "Merchant Navy" class engine, as it ran past four to five minutes later at diminishing speed with brakes fully applied. No passenger was injured and those in the electric train were able to proceed after the leading six coaches had been separated from the last two. The steam train was only slightly damaged and was allowed to travel forward after examination, but there was considerable delay to traffic until repairs to the down local were completed at 8.25 a.m. next morning. It was very cold—about 27°F. at Farnborough at 6 p.m.—with patches of fog.



Condition of rail which caused derailment of electric train

The Track

The track consisted of 95-lb. 45-ft. rails laid in 1930 and re-sleepered in 1948, worn to an average of 86 lb., 2 lb. above the permissible minimum; and it was programmed for renewal in about another four to five years. Sleepers were in good condition and the track as a whole in excellent alignment and level, well packed and on a solid dry formation. The four-hole fishplates were 18 in. long. As shown on the accompanying drawing the bolt holes in the rail web were 1¼ in. dia. at 4½ in. centres and between them were two drilled holes, ⅞ in. dia., for duplicate pressed-in traction bonds. Only one of these latter was in use, however, as welded bonds had been fixed in 1948; using these enables the second copper bond and corresponding hole to be omitted and the holes are a source of weakness. The welded bond was introduced on the former Southern Railway as standard in 1936 and the size of the remaining bond holes then reduced to ¾ in.

The motorman of the electric train said he was severely checked by signals at Brookwood and then accelerated only moderately, while looking through the fog for others. He noticed a pressure drop on the brake gauge and automatic brake application, so he applied the brake and the train stopped in the usual manner, as far as he was aware. From the left-hand side he called to the guard in the fourth coach that something had gone wrong with the brake and saw him getting down; he did so also and walked towards the guard. Both men assumed that the communication cord had been pulled and the guard did not think of stepping across his compartment to look out on the other side. He spoke to the motorman and, walking back, found the last coach to be derailed, which had caused the brake application. He collected detonators and lamp and at about 20 yd. from the train saw the express approaching. He put down a detonator and ran on waving his lamp, later proceeding to Brookwood to advise the signalman.

By rule, both men should have looked out towards the adjacent line to see if it was obstructed and had the guard done so he might have seen the outline of the derailed vehicle and been quicker in protecting the through line, but he would not have been able to get far enough to stop the express in time.

The driver of that train said he passed Brookwood at about 65 m.p.h., saw the tail lamp of the electric train and then the guard's lamp, applied the brake and opened the sanders. His train travelled 470 yd. beyond the guard's lamp and stopped with its rear coach near the front of the other one. As a good stopping distance would be about 750 yd. the driver evidently had seen the danger signal at some distance in spite of the fog. Score marks of derailed wheels led back 163 yd. from the electric train to an 11 in. break in the right-hand rail, where a piece of the head and web at the running on end had become dislodged although the fishplates were still in place. This piece was found at about one rail length ahead of the break. There was a deep dent from a wheel flange on the fractured end of the rail and a dent on the side of the head of the dislodged piece appeared also to have been caused by a flange. The lower portion of the rail end also had become detached but was still held by the fishplates.

The ganger described how he carried out his inspections and said he had that morning found a broken wing rail in a crossing on the up through line at Brookwood and had renewed it. The only other time there had been a broken rail on the length during his 18 months in charge here had been six months before, when he detected a crack in a rail head, 13 in. from the running-on end in the down local. He found no crack when removing and oiling fishplates in March, 1956.

The permanent way inspector, for five years on this section, could not remember a broken rail on the length before the one found six months prior to the accident.

Rail Fracture

The accompanying drawing shows the condition of the rail, which was reported on by the Metallurgical Division of British Railways Research Department. This mentioned the bright and worn condition of the fishing surfaces under the head of the dislodged portion, showing that very heavy rubbing or chattering had taken place, probably subsequently to complete detachment but before the derailment and went on to say "all the fracture faces were rusty except the more or less vertical one from the second bolt hole through the head. This, although rather battered, due to chattering of the loose head, was of more recent origin and probably was the last to occur. Small fatigue flaws were present at the corners where the web fracture connected with the original end of the rail and also from the four holes in the web. These indicate the direction of growth of the cracks, but it is not easy to be certain of their sequence."

The conclusions of this report were that the rail was of normal quality, complying with B.S. specifications, and that small slow-growing fatigue flaws had developed from its end near the top of the web and from each of the holes, which progressed rapidly later and caused complete fracture through the web. It was difficult to say where the fracture started but the two small fatigue flaws running from the rail end were of old standing. Until the head had become completely detached it would have been impossible for the lengthman to have seen the cracks without removing the fishplates.

Inspecting Officer's Conclusion

Colonel Reed makes no recommendation in this case. He concludes that the final break through the rail head must have occurred some little time before the end portion became dislodged. Rubbing of the fracture faces and fishing surfaces can only have been due to the impact of wheels on the loosely held detached head. He saw no reason to doubt that the head was intact when the ganger walked by. The fracture through the foot occurred earlier and would have been difficult to see, being masked by the chair. The ganger could not be blamed for not detecting the break. The driver of the steam train acted on the guard's danger signal at the earliest possible moment and the failure of the latter and his motorman

to look towards the adjacent line when the brake came on is understandable, but they had no right to assume that to have been caused by pulling of the communication cord; they should certainly have made an effort immediately to find out if any obstruction had been caused to the adjacent line. The accident serves as a good illustration of the value of that rule in general.

The metallurgical report shows the rail to have been of standard quality with no inherent flaw in the broken piece predisposing it to fracture. The fatigue flaws were typical of their kind and developed from repeated stress reversals from passing wheels. The rail came to the end of its life through the effects of fatigue to which others on the section had been equally subject. This is the second rail-end failure within six months, after many years without trouble, and there is a chance of more such; it has been decided, therefore, to bring forward the relaying to 1958.

Remarks

This type of flaw begins at a sharp edge and its onset can be greatly postponed, if not prevented, by giving a radius or chamfer to all edges at rail ends and bolt and bond holes. The value of this additional work is under consideration. Omission of one of the bonds should improve the position and that of the other do so still further, but the Southern Region are not yet fully satisfied that welded bonds are reliable enough for the duplicate pressed-in bond to be omitted.

Detection of rail failures always has been the responsibility of the ganger, although in tunnels additional arrangements often are made. Daily visual inspection has been in general satisfactory and of the 300 cases of broken, cracked or otherwise defective rails changed each year on the S.R. running lines two-thirds approximately represent defects detected before developing into breaks. There has been no previous accident on this Region from this cause for many years, but there have been seven derailments caused by broken rails in other Regions in the last five years, most of them in or close to stations where speeds were low and track conditions specially difficult. Only one of these derailments, in a tunnel near Watford (see our issue of August 27, 1954, page 246), was serious.

Ultrasonic Testing

Visual inspection has been supplemented in recent years by ultrasonic testing, but at present the operator needs special training and experience to undertake routine testing. This is used on the Southern Region for annual testing in tunnels and on selected open track lengths on which an unduly high proportion of rail failures or a large number of wheel burns on running surfaces are known to have occurred.

Such testing is being increased to include more frequent examination in certain tunnels and those sections where rail ends have two bond holes, and where rails are thought to be reaching fatigue limit.

Incidence of rail failures on British Railways has improved greatly since 1951, when the consequences of war deferment of renewals were apparent. Further reduction will depend on many factors, the subject of research by the B.T.C., and Colonel Reed does not doubt that failures will become progressively more infrequent as a result; in the meantime, records show that risk of accident from this cause is small.

Portal Structures for 25-kV 50-Cycle A.C. Overhead Electric Equipment

Satisfactory tests of prototype for British Railways

Overhead electrification in Britain has generally been carried out in the past at 1,500 V. d.c., and heavy steel supports were necessary to carry the large-section wires and their associated equipment. Now that 25-kV. a.c. electrification has been adopted by the British Transport Commission for British Railways, smaller wires can be used; but to ensure good current collection at all times they must be kept at constant tension, by balance weights, throughout most of the temperature range. As the temperature varies the wires move along track, thus applying a torque to the bridge of any portal structure used to support them.

Lightness and Economy

To meet these new loading conditions careful consideration had to be given to the design of a supporting structure combining lightness, economy in manufacture, avoidance of obstruction to the sighting of signals, and good appearance. A new type of portal structure to fulfil these needs has now been designed and developed by the Traction Department of British Insulated Callender's Construction Co. Ltd. to the requirements of the Chief Electrical Engineer and the Chief Civil Engineer, British Railways Central Staff, B.T.C. It is constructed with angles as the main members and rod bracing welded to the toes of the angles. After fabrication the complete structure is galvanised.

Prototype Structure

Recently a prototype structure was constructed and tested at Painter Bros. Ltd. Works, Hereford. It is designed for use over five tracks, has a span of 71 ft., weighs 1¼ tons, and is fabricated from 2 in. × 2 in. × $\frac{5}{16}$ in. angles and $\frac{5}{8}$ in. rods jig-welded to the angles. The heavy type of structure previously used for 1,500-V. d.c. equipment with the same span would have weighed about 2½ tons.

At the tests, loads typical of those that would be caused by the equipment and by wind were applied to the structure. There was no undue deflection and no permanent "set" when loads of 1½ times the maximum working loads were applied, and there was no failure when the loads were increased further to 2¼ times the working loads. The accompanying illustration shows the structure just before the loads were applied.

Standard Type

This welded rod type of structure will be a standard type for use when three, four or five tracks are spanned and it will be employed in large numbers in the extensive main-line electrification at 25 kV., 50 cycle a.c. for British Railways.

The design of structure meets with the general approval of the B.T.C. Design Panel, having been modified slightly since the tests to improve its appearance. The revised design illustrated shows the pleasing and relatively unobtrusive appearance of the structure.

Trafford Park Locomotive Depot Being Modernised.—Work has started on the building of a modernised locomotive depot at Trafford Park, Manchester, London Midland Region. New paving will be provided and tracks will be relayed on concrete foundations. Electric lighting will replace gas throughout the shed, yard, and offices and fluorescent lighting will be installed in the examination pits. The scheme will also include a concrete walkway across the 20 engine roads.

Prototype portal structure spanning 71 ft. for overhead electrification on British Railways, erected for testing purposes at Hereford

Modernised Public Rooms at Sheffield Victoria

Large-scale murals of railway interest

A complete modernisation scheme is being carried out by the Eastern Region of British Railways in the waiting rooms, ladies' toilets, and refreshment rooms at Sheffield Victoria Station. The scheme is being executed in stages in order to maintain facilities and minimise inconvenience to passengers while the work is in progress.

First Stage Completed

The first stage was completed on July 23, when the Deputy Lord Mayor of Sheffield formally opened the ladies' waiting room and toilets and the general waiting room on No. 3 platform. Also present at the ceremony were Councillor J. B. Peile, Member of the Eastern Area Board; Mr. G. F. Fiennes, Operating Superintendent, Eastern Region; Mr. R. B. Temple, District Goods Manager, Sheffield; Mr. E. R. Williams, District Passenger Manager, Sheffield; Mr. E. S. Gellatly, District Operating Superintendent, Manchester; and Mr. P. Williamson, Stationmaster, Sheffield Victoria.

New floor and wall coverings, lighting fittings, and heaters have been provided throughout and generally all the fittings and furnishings have been chosen for their good appearance, wearing qualities, and freedom from maintenance. In the ladies' lavatories new sanitary fittings have been installed and the existing drainage completely renewed. The lavatory walls are tiled throughout to a height of 7 ft. and a special fitting is provided for a powder shelf and make-up mirrors. An attendant's cubicle is provided in which are housed general-purpose cupboards and sink.

Complete Refurnishing

The ladies' and general waiting rooms have been completely refurnished with upholstered armchairs and bench seats specially designed for the Eastern Region by Robin Day. The waiting room walls are lined with plastic sheeting and a mosaic panel is provided behind each heater.

In the general waiting room the decorations include a large-scale mural which comprises an enlarged photo laminate reproduction of the original working drawing of a "12" class 2-4-0 locomotive of the Manchester, Sheffield & Lincolnshire Railway. Adjoining this mural is a timetable reproduction showing the 1843 service of the Sheffield, Ashton-under-Lyne & Manchester Railway. Superimposed on this timetable is the coat of arms of its successor of 1847, the Manchester, Sheffield & Lincolnshire Railway.

There is also a large mural in the ladies' waiting room which is an enlarged reproduction of an etching based on the famous painting of 1862, "The Railway Station" (Paddington), by William Powell Frith, R.A. (1819-1909).

The modernised waiting rooms and ladies' toilets were designed by the Regional Architect, Mr. H. H. Powell, under the general direction of Mr. A. K. Terris, Chief Civil Engineer, Eastern Region. The general contractors for the work are George Longden & Son Ltd., Sheffield, 1.

Staff and Labour Matters

T.S.S.A. Salary Move

The Transport Salaried Staffs' Association has asked the B.T.C. for an early meeting to discuss salaries. The immediate concern of the T.S.S.A., which recently agreed to give "formal and sympathetic" consideration to B.T.C. proposals that there should be periodic reviews of matters affecting pay and conditions of service, seems to be the fact that the index of retail prices has risen by three points since the wage settlement in March last. No such review has taken place and it is unlikely that the B.T.C. expected to be asked to hold one so soon after the last wage settlement.

London Busmen's Wage Claim

A new pay claim for London Transport bus workers has been discussed by a committee of the Transport & General Workers' Union officials and delegates; it is understood the committee's decision will be put before the T.G.W.U. Executive, which will require to approve the claim and also decide when it should be lodged.

The last increase in pay for London busmen was given last January, and was back-dated to October, 1956. The increase was 7s. 6d. a week in response to a claim for a £1 a week increase.

EAST AFRICAN RAILWAYS & HARBOURS FILMS.—Sir Arthur Kirby, retiring General Manager of East African Railways & Harbours, was host on August 21 at an informal showing in London of the E.A.R. & H. films "Princess Margaret Visits East Africa," and "Annual Film Review, 1956." As Princess Margaret's visit was one of the most notable events of 1956, shots of some of the ceremonies shown in the record of her visit were included in the review, among them the opening of the deep-water berths at Dar-es-Salaam, and her visit to the E.A.R. workshops in Nairobi, escorted by Sir Arthur Kirby. The review also showed development work of various kinds and some interesting shots of the Western Uganda extension, with the opening ceremony. Sir Arthur Kirby said he hoped more such films of work in East Africa would become available here. Among those present were Mr. J. R. Farquharson, who succeeds Sir Arthur Kirby as General Manager, and Mr. V. G. Matthews, Commissioner for East Africa, whom Sir Arthur Kirby succeeds on his retirement at the end of the year.

Reproduction of an etching based on the painting of 1862, "*The Railway Station*", *by W. P. Frith, on the wall of the general waiting room at Sheffield Victoria Station*

Enlarged photo-laminate reproduction of drawing of a 2-4-0 *locomotive of the Manchester, Sheffield & Lincolnshire Railway, used as a mural in the general waiting room*

Contracts and Tenders

Narrow-gauge wagons for the Sudan: diesel shunting locomotives required for Australia

Robert Hudson Limited has received three orders for a total of 560 narrow-gauge wagons for the Sudan, to the value of £660,000.

The German firm of Siemens Bauunion has been awarded the contract for the construction of a new underground line in Buenos Aires, linking the Constitución-Boedo underground line with the Plaza Mayo. The value of the contract is 110 million pesos.

It has been announced that the £55,000,000 contract between the Sao Paulo City Administration and the Alweg Monorail Corporation (Bahamas), for the rebuilding of the Sao Paulo public transport system on the Alweg principle, has been signed. This project was referred to editorially in our issue of January 18, 1957.

British Railways, Eastern Region, have placed the following contracts:—

Caffin & Co. Ltd., London, W.C.2: reconstruction of portion of superstructure of Pelly Road overbridge No. 51 over steam lines between Plaistow and Upton Park

J. H. Curruthers & Co. Ltd., Glasgow, S.2: supply, delivery, and erection of one 30-ton electric travelling "Goliath" crane and ancillary equipment for Doncaster Crimpsall Yard

Fletcher & Co. (Contractors) Ltd., Mansfield: general repairs to, and strengthening of, Muskham Viaduct No. 280, between Newark and Carlton-on-Trent

R. Ridd & Son (Contractors) Ltd., Hornchurch, Essex: cleaning and painting of station buildings, goods & coal yards, and signalboxes, between Wanstead Park Station and Crouch Hill Tunnel

The Atlas Engineering Company, London, S.W.7: supply and delivery of one wheel profile truing machine for Stratford Locomotive Works

T. Jenkinson & Sons (Doncaster) Ltd., Doncaster: modification of goods warehouse at Chesterfield Central Goods Yard

W. & C. French Limited, Buckhurst Hill, Essex: reconstruction and widening of overbridge No. 37, embankments and approach roads, between Upminster and West Horndon at Front Lane, Cranham

George Simpson (London) Limited, London, S.W.1: reconstruction of engine shed at Barrow Hill and Staveley Motive Power Depot.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from Australia for diesel-hydraulic, or diesel-electric shunting locomotives as follows:—

25 diesel-hydraulic shunting locomotives

Alternatively

25 diesel-electric shunting locomotives one set of spare parts

one complete set of working drawings

The Issuing Authority is the Victorian Railways. The tender No. is 61,212. Bids should be sent to the Secretary for Victorian Railways, Railways Administrative Offices, Melbourne C.1, Australia. The closing date is October 16, 1957. A copy of the tender documents is available for loan to United Kingdom firms on application. A photo-copy set can be purchased from the Branch for 19s. Cheques and postal orders should be made payable to the Principal Accountant, Board of Trade. Firms wishing to collect photo-copy sets of tender documents are advised to notify the Branch in advance of their requirements. The reference ESB/20092/57 should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from Pakistan for 101 metre-gauge all-steel lightweight carriages.

The issuing authority and address to which bids should be sent is the Director-General, Railways, Ministry of Communications (Railway Division), Government of Pakistan, Karachi. The tender No. is PRS-57/CARR/4/TDR. The closing date is October 23, 1957. A copy of the tender documents is available for loan to United Kingdom firms on application to the Branch (Lacon House, Theobalds Road, W.C.1). Local representation is essential. The Branch will, on request, supply a list of the local concerns who have expressed their willingness to act on behalf of United Kingdom firms. The reference ESB/20239/57 should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from Iraq for railway sleepers as follows:—

(*a*) 150,000 hardwood railway sleepers for meter gauge, 6 ft. x 8 in. x 4½ in. (TEN/27594)

(*b*) 120,000 hardwood railway sleepers for standard gauge, 8 ft. 6 in. x 10 in. x 5 in. (TEN/27595)

The Issuing Authority is the Iraqi State Railways. The closing date is September 4, 1957. Tender documents with conditions and specifications are obtainable from the Office of the Director General, Iraqi State Railways, Baghdad West. Local representation is essential. No further information is available in the Branch about these calls for tenders. The Reference (*a*) ESB/19604/57 and (*b*) ESB/19605/57 should be quoted in any correspondence with the Branch (Lacon House, Theobalds Road, W.C.1.).

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from Formosa for all-steel covered wagons as follows:—

5 all-steel covered wagons, loading capacity 15 ton (volumetric capacity 37 cu. metres), tare weight about 9·5 tons, overall length (between pulling faces of couplers) 7,800 mm., overall height above rail top, 3,720 mm., overall width (over side door lock) 2,666 mm.

100 all-steel covered wagons, loading capacity 30 ton (volumetric capacity 71·7 cu. metres), tare weight of the car about 16·5 tons, overall length (between pulling faces of couplers) 13,950 mm., overall height above rail top 3,607 mm., overall width (over side door lock) 2,882 mm.

The Issuing Authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68, Yen Ping Nan Road, Taipei, Taiwan, (Formosa). The tender No. is 84-33-427-9-70272. This purchase will be financed by the International Co-operation Administration (I.C.A.). The closing date is September 9, 1957. United Kingdom firms who wish to tender should if possible obtain the necessary documents direct from the Central Trust of China. A copy of the specifications and conditions of tendering is available for inspection in Room 735 at the Branch (Lacon House, Theobalds Road, W.C.1.). An additional copy is available for loan on application. Photo-copy sets of the documents can be obtained at the cost of 19s. from the Branch. Cheques and postal orders should be made payable to the Principal Accountant, Board of Trade. The reference ESB/19925/57/I.C.A. should be quoted in any correspondence with the Branch.

The Special Register Information Service, Export Services Branch, Board of Trade, has received a call from India for boiler flues as follows:—

720 boiler flues, solid drawn steel or E.R.W. tubes, 17 ft. 7½ in. long, 5¾ in. o.s. dia., 8 IMP. S.W.G. thick throughout (the smokebox end of the flue to be expanded for a distance of 4½ in. as shown on the drgs. and the firebox end of the flues to be reduced for a distance of 5 in. as shown on the drg.), suitable for AWD/CWD. type of engines. To C.R. drg. No. BR (SP) 26, alt. 1 (D.G.I. & S. No. 4252/1) and I.R.S. specn. No. R-23/51 alt. (E.R.W. tubes) to B.S.S. 1654

The issuing authority is the Director General of Supplies and Disposals. Bids should be sent to the Director General of Supplies and Disposals, Shahjahan Road, New Delhi. The closing date is September 5, 1957. A set of tender documents, and drawing, is available for loan to United Kingdom firms on application to the Branch (Lacon House, Theobalds Road, W.C.1). Local representation is essential. The reference ESB/20203/57 should be quoted in any correspondence with the Branch.

GEORGE COHEN SONS & CO. LTD.—The Raw Materials Division of George Cohen Sons & Co. Ltd., which covers ferrous scrap, steel and dismantling, has moved its headquarters to 600, Wood Lane, Shepherds Bush, London, W.12. Telephone Shepherds Bush 2070; telex No. 22461.

SPEKELAND ROAD MODERNISATION.—The London Midland Region of British Railways has announced that work has started on the erection of the new Goods Department shed at Spekeland Road. When completed it will mark the first step in a general scheme for the complete reorganisation of goods terminal working in the Liverpool and Birkenhead area. Under the scheme, all small consignments from Liverpool will be handled at Spekeland Road. This will facilitate speedier handling of goods at the Edge Hill depot, Liverpool, and at Morpeth Dock, Birkenhead, where at present a heavy traffic of both inwards and outwards small consignments is dealt with. The shed will be 620 ft. long by 104 ft. wide, constructed of prestressed reinforced concrete frames spanning the full width and supporting a glass roof. Four sidings will enter the shed, the floor of which will be concreted to form roadways for the road vehicles.

Notes and News

Change of Address.—The address of Gabriel & Co. Ltd. is now 76, Victoria Street, London, S.W.1. The telephone number, Tate Gallery 1517, remains unchanged.

Hurst, Nelson London Address.—The address of the London office of Hurst, Nelson & Co. Ltd. is now 76, Victoria Street, S.W.1. The telephone number remains unchanged at Tate Gallery 0404.

B.I.C.C. Edinburgh Branch Office Telephone Number.—Because of changes in the names of Edinburgh telephone exchanges, the numbers of the Edinburgh branch office of British Insulated Callender's Cables Limited will be Caledonian 6786/7/8, as from August 31.

Indian Railways Budget, 1957-58.—In the second paragraph of the editorial article on page 445 of our April 19 issue, the figure of net ton-miles per wagon day attained by the broad-gauge railways in the Republic of India in 1955-56 was stated to be 514. The correct figure is 541.

Farnborough Air Display, 1957.—For the Society of British Aircraft Constructors Flying Display & Exhibition at Farnborough on September 6, 7, and 8, the Southern Region will issue cheap tickets from London and many other stations to Farnborough and to Aldershot and North Camp Stations. The Aldershot & District Traction Company will operate a service of buses from Aldershot and North Camp Stations to the airfield. There will be special combined rail and road tickets at attractive fares, such as Waterloo to Farnborough, 9s.

B.U.T. Rail Traction Exhibits.—Three exhibits, relating to diesel rail traction, are being shown by British United Traction Limited at the Engineering, Marine, Welding & Nuclear Energy Exhibition, Olympia, London. They include a complete driver's cab of a British Railways lightweight diesel train, and two horizontal diesel engines, one being the recently developed 230 h.p. engine. The second engine, which is displayed in section, is one of the 150 h.p. range. Some 1,000 power cars fitted with this unit have now been supplied to British Railways.

New British Oxygen Welding School.—A new welding school was opened by British Oxygen Gases Limited on August 12, which provides welding and cutting instruction for employees of industrial firms in the Birmingham area. The school is at the company's Midlands headquarters at Hockley. It has permanent accommodation for nine students of gas welding, and two argon welding students. Included in its programme are pipe welding courses of six weeks' duration, and general courses in both welding and maintenance. Gas welding and cutting blowpipes, straight line and profile cutting machines, and argon equipment have been installed. There are facilities for lectures and film shows. About 100 students a year pass through the school. Many engineering firms, and in particular heating and ventilating firms, send their apprentices to receive tuition. Students come not only from the district, but also from abroad.

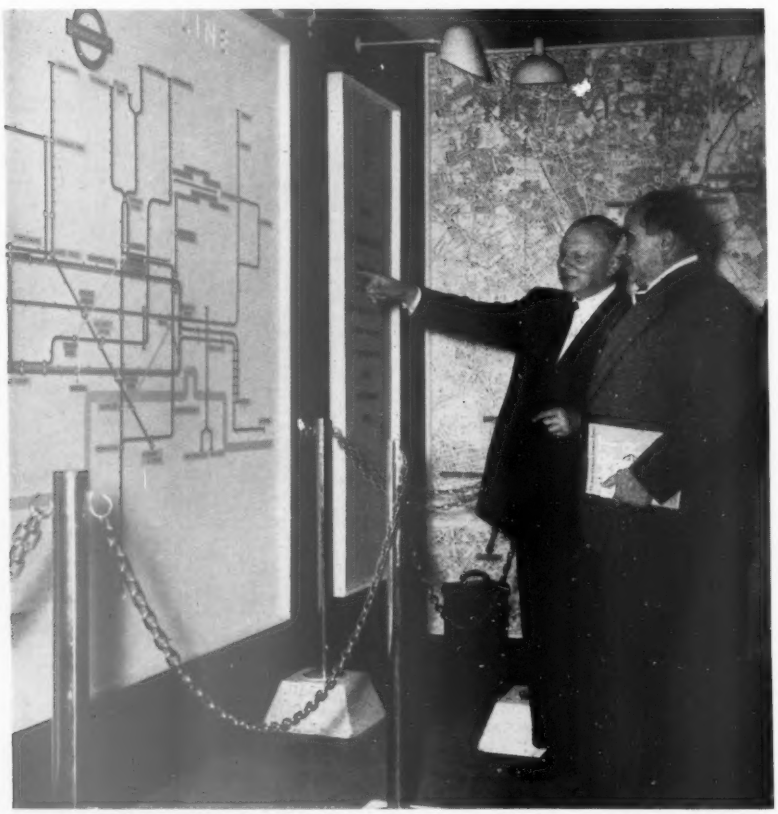
United Steel Companies Exhibit at Olympia.—A development in rolling mill bearings, produced by a subsidiary company, will be one of the exhibits on the stand of the United Steel Companies Limited at the Engineering, Marine, Welding & Nuclear Energy Exhibition which is being held at Olympia, London, until September 12. Produced from a new synthetic resin, these bearings are stated to have given some outstanding results on the company's rolling mill and are now being made generally available for the first time.

British Transport Containers for Utrecht Fair.—Three rail and two road containers operated by British Railways and British Road Services are to be included in the International Container Bureau Exhibition at Utrecht Fair on September 3-9. The British Railways containers to be exhibited are the "AF" type, designed for the conveyance of ice cream and quick-frozen foods; the "AX" for dry ice; and the "BK" type for furniture removals and new furniture. British Road Services are exhibiting a 10-ton general traffic container and a 6-ton insulated meat container.

Fishguard & Rosslare Railways & Harbours Company.—The net revenue of the Fishguard & Rosslare Railways & Harbours Company for the half-year ended June 30, 1957, was £35,563. This represents £35,755 provided under guarantee by the British Transport Commission and Coras Iompair Eireann less £192 for fees, salaries, and expenses. Capital expenditure included £552 for improved cranage facilities at Fishguard Harbour and estimates of £22,186 for future expenditure on capital account include £19,780 for improved cranage facilities at Rosslare Harbour.

Reducing Industrial Development Costs.—At a press conference in London on August 22, Mr. Colin A. Samuels, Managing Director of C.A.S. (Industrial Developments) Limited, explained some of the methods used by his company to speed up building operations, thus saving costs. The C.A.S. group has completed recently three major projects at a total cost of £1,300,000, representing a saving of £150,000 as compared with normal building methods and a saving in time, on an already tight schedule, of 9½ months. The three projects included a 180,000-sq. ft. factory for the manufacture of Permali products at Gloucester. The basic principle, which made this achievement possible, Mr. Samuels explained, is teamwork throughout the entire group, representing the industrialist, the developer, the consultants (architect, consulting engineer and quantity surveyor) and the contractor. The same team is used on all C.A.S. group projects on the theory that teamwork is impossible on anything but a permanent basis. There is no competitive tendering in the

At the Hampstead Tube Exhibition



Sir John Elliot, Chairman of London Transport, with Monsieur Louis Armand, President of the French National Railways, at the exhibition of contemporary posters and other material being held at Charing Cross Underground Station to mark the jubilee of the Hampstead Tube (see last week's issue)

accepted sense in the group; every contractor and sub-contractor works on a negotiated price basis and keeps his place in the team so long as the price is right, the work is in the best traditions of British craftsmanship, and as long as top priority in manpower, materials and plant is given to the group. Apart from teamwork, great stress is placed on proper pre-planning and an avoidance of changes in requirements once work on the ground has started.

Cast Steel Roller Bearing Axlebox Housing Manufacture.—An agreement has been entered into by the K.G.S. Bearing Co. Ltd. and F. H. Lloyd & Co. Ltd., Darlaston, which provides for the manufacture in the United Kingdom of cast steel roller bearing axlebox housings by the latter company.

Aircraft Crash on Railway.—A Sea Hawk aircraft from Ford naval air station in Sussex crashed on the Southern Region railway line at Arundel Junction on August 26. The pilot was killed. The wreckage short-circuited the live rails and for some time trains could neither enter nor leave Littlehampton. There was some delay to trains, but the line was re-opened as soon as the wreckage had been cleared.

English Electric Interim Dividend.—An interim ordinary dividend of 4 per cent is declared by the English Electric Co. Ltd. on capital increased from £15,221,721 to £18,266,065 by a one-for-five rights issue. For the year ended December 29 last an interim dividend of 4 per cent and a final of 10 per cent were paid on the lower capital.

Hackbridge Holdings Dividend.—Hackbridge Holdings Limited, formerly Hackbridge Cable Holdings Limited, is reducing its final payment to 10 per cent, resulting in an ordinary dividend of 20 per cent for the year ended March 31 last against 30 per cent for the previous year. Group profits fell to £122,168 from £187,105, after tax of £189,819 (£229,479).

Testing Vulcanised Rubber.—The British Standards Institution has issued Parts C.4 and D.4 of B.S. 903, "Methods of testing vulcanised rubber." These two publications are the most recent to emerge in the course of revising B.S. 903 and issuing it in separate parts. Each part specifies the test pieces, apparatus, procedure, and the method of calculating results. Part C.4 specifies three methods: "one-minute value," "the step-by-step method" (which gives results approximating to those of the "one-minute value" method) and the "one minute proof test." Part D.4 also contains requirements for a proof test of cross-breaking strength of ebonite. Copies of B.S. 903, Parts C.4 and D.4, are obtainable from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 3s. and 2s. 6d. respectively.

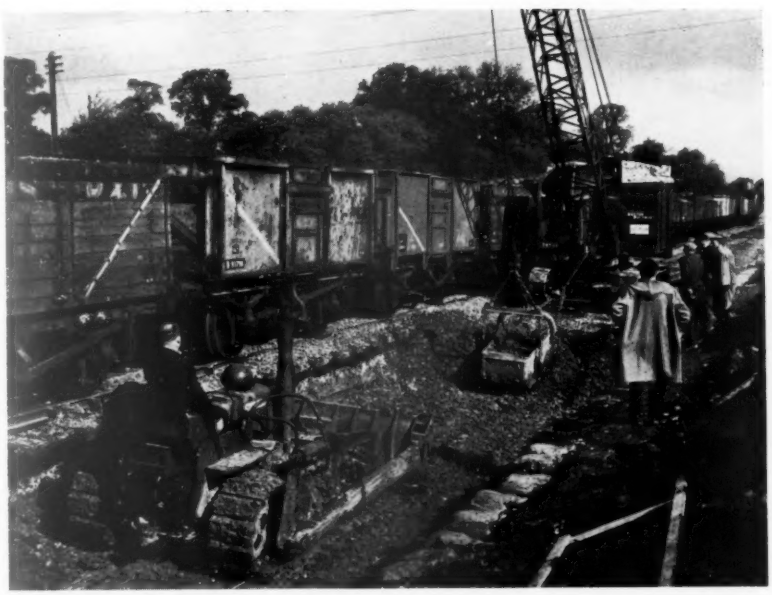
East Indian Railway Officers' Dinner, 1957.—The fifty-fourth annual dinner of East Indian Railway Officers will be held at the Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2, on September 25, at 6.30 for 7 p.m. The Chairman will be Mr. H. J. Allinson, and the principal guest Sir Douglas Gordon, late Indian Police. Tickets, 22s. each, may be obtained from the Hon. Secretary, Mr. R. C. Harvey, Aros Shona, Copthorne, Sussex, tel. (residence) Copthorne 0115, (office) Victoria 8494. Applications, with remittances made payable to the East Indian Railway Officers' Dinner Association, should be sent to arrive not later than September 18. The 1958 dinner will be held on September 24, 1958. The reunion tea party for members, their wives, families, and guests will be held at St. Ermins Hotel, Caxton Street, Westminster, S.W.1, on September 26, from 3.30 to 6 p.m. The inclusive charge for one ticket will be 7s. Additional tickets for wives, families, or guests will be 6s. 6d. each. Application, with remittance made payable to Mona Cambridge, should be sent to reach the Hon. Secretary, Mrs. Mona Cambridge, Horringford House, Luccombe Road, Shanklin, Isle of Wight, not later than September 19.

London Midland Region Station Closings.—The London Midland Region has announced the closing from September 16 of Hornby (between Lancaster and Skipton), Winson Green (Birmingham), and Brinklow and Shilton (between Rugby and Nuneaton) stations. Bus services are available in the areas concerned, and alternative arrangements have been made to deal with parcels. The present arrangements for freight traffic will continue at Hornby, Brinklow, and Shilton. The goods depot at Red Rock (between Wigan and Blackburn) will be closed from September 2. Alternative arrangements will be made for merchandise, minerals, and livestock traffic; coal class traffic will be sent to destinations requested by traders.

Railway Arrangements for Scout Jamboree.—The gathering of some 33,000 boy scouts at Sutton Park for the recent International Jubilee Jamboree, held at the busiest holiday period of the year, presented the London Midland Region with many difficulties. For the opening of the jamboree, 54 special trains were run to the three stations serving the camp, Sutton Coldfield, Sutton Park, and Streetly, bringing scouts from all parts of the country and foreign contingents from the ports. Some 25,000 scouts were encamped by July 31. The dispersal necessitated 56 specials; this movement had to be carried out on August 13 and 14. Many special trains were run during the period. Each scout whilst in camp was given the opportunity of going on two excursions to places of interest in surrounding areas and 86 special trains were arranged. For visitors to the camp 108 special trains were run. Temporary signalboxes were installed at Streetly and Penns and a special railway office at the jamboree was linked with the London Midland teleprinter network.

"Model Engineer" Exhibition Opened.—The Earl of Northesk, President of the Society of Model & Experimental Engineers, opened the Model Engineer Exhibition at the New Horticultural Hall, London, on August 21. He is also acting as chairman of the panel of judges in the Duke of Edinburgh Trophy Competition for the outstanding model of the entire exhibition. The Historical Relics section of British Railways has two areas showing items of particular railway and engineering interest, similar to those at the Transport Treasures Exhibition at Euston. Among the items on show are models of a 400-h.p. diesel-electric locomotive and a diesel-hydraulic 200-300-h.p. shunter on loan from the Yorkshire Engine Co. Ltd. and the North British Locomotive Co. Ltd. respectively. The English Electric Co. Ltd. has lent models of a 3,600-h.p. 1,500-V. d.c. main-line electric locomotive as supplied to the Central Railway of India and of a 750-h.p. Bo-Bo diesel-electric locomotive as supplied to the Nigerian Railway. British Railways are showing a colour-light signalling layout. The exhibition closes tomorrow (August 31).

Permanent Way Work on the Ockendon Branch



Track drainage work and blanketing in progress on the single-line Ockendon Branch of the Eastern Region : the track on the left was specially laid in for spoil trains

Railway Stock Market

International developments, more particularly in the Middle East, affected stock markets, which failed to respond to the official denial that the £ is to be devalued. The lower prices were attributed as much to absence of demand as to selling.

Railway stocks have attracted only very moderate attention again, though despite the limited number of stocks in this section of markets there are selections which should suit the different requirements of investors.

Canadian Pacifics are now $66¼ at which there is a yield of fully 5 per cent. This is really a generous return and well above yields on many other Canadian stocks. Canadian Pacifics, because of the company's diversified interests, offer an attractive means for an investor to participate in the future of this Dominion. Moreover, the company's 4 per cent debentures which at 61½ yield 6½ per cent, and the 4 per cent non-cumulative preference stock yielding 7 per cent at 56½, both are investments well covered as to interest, and being sterling securities have prospects of showing good appreciation in price in the future when fixed interest stocks in Britain have the stimulus of a cheaper money trend.

For those investors who desire a large yield of around 11 per cent with perhaps scope for substantial capital appreciation the ordinary and preference stocks of the Antofagasta Railway might prove attractive. Last year dividends on the ordinary stock were restarted with 4 per cent and moreover the interest on the preference stock is 5 per cent. The scope for capital appreciation depends almost entirely on the possibility that, as has so often been rumoured, there is a nationalisation move by the Government, or perhaps a take-over offer by American interests. On break-up value estimates both stocks would be worth at least par.

Nyasaland Railways £1 shares are now 12s. This company is one of the few railway concerns in the world today with a rising dividend record. Dividends were started for 1955 with 2½ per cent and last year there was an increase to 3½ per cent. An annual increase is too much to expect, but the outlook looks promising, and there seem reasonable prospects of these interesting shares proving a rewarding investment as time proceeds. At their present price the shares yield fully 5¼ per cent on the basis of last year's 3½ per cent dividend.

Among shares of locomotive builders and engineers, Charles Roberts 5s. shares at around 10s. 6d. xd continued under the influence of the chairman's encouraging remarks about the position and outlook. Beyer, Peacock 5s. shares receded from 10s. to 9s. 6d., while Hurst Nelson at 33s. have continued to hold their recent rally at Glasgow, but Birmingham Wagon at 19s. 7½d. have not recovered from their reaction.

North British Locomotive shares have been rather more active around 18s. 6d. Delta Metal were 23s. 6d. and James Booth kept around the higher level of 43s. 1½d. after further consideration of the Delta Metal offer. Gloucester Wagon 10s. shares were again around 15s. 6d.

Westinghouse Brake at 37s. 6d. have been quite well maintained at which there is a yield of 4⅞ per cent assuming the dividend on the larger capital ranking were 9 per cent as forecast by the directors. The actual forecast was "not less than 9 per cent" and there are hopes in the City that the dividend may be 10 per cent. On this basis there would be a yield of 5¼ per cent at the current price of the shares.

T. W. Ward at 79s. 3d. have been firmer. John Brown remained around 33s. 9d. on further consideration of the chairman's speech and wider recognition of the group's widespread interests in engineering and fields outside shipbuilding. Associated Electrical were 59s. 9d., General Electric 46s., and English Electric 59s. 7½d. xd. Pressed Steel 5s. shares changed hands around 17s. and the 10s. shares of the Dowty Group were 35s.

Forthcoming Meetings

Open currently and until further notice.—British Transport Commission: Historical Exhibition "Transport Treasures" in Shareholders' Meeting Room, Euston Station, from 10 a.m. to 6 p.m. on weekdays, and 2 to 6 p.m. on Sundays. Admission 6d.

August 30 (*Fri.*).—to September 8 (*Sun.*).—Railway Correspondence & Travel Society. Tour of Denmark.

September 3 (*Tue.*).—Permanent Way Institution, Leeds & Bradford Section, at the British Railways Social & Recreation Club, Ellis Court, Leeds City North Station, at 7 p.m. Paper on "Ballast and formation renewal," illustrated by lantern slides, by Mr. M. F. Barbey, assistant to Engineer (Bridges), North Eastern Region, York.

September 6 (*Fri.*).—The Railway Club, at 320, High Holborn, London, W.C.1, at 7 p.m. Paper by Mr. T. B. Sands on "Savernake and district—a railway crossroads in Wiltshire."

September 7 (*Sat.*).—Electric Railway Society. "Meet Mr. J. W. Vigrass, of Cleveland, U.S.A." Fred Tallant Hall, 153, Drummond Street, N.W.1, at 7.15 p.m.

September 10 (*Tue.*).—Railway Correspondence & Travel Society, East Midlands Branch, at the N.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. "Railway colour photography" shown by Messrs. E. H. Miller, L. Taylor and R. W. Sheppard.

September 13 (*Fri.*). to September 16 (*Mon.*).—Institute of Transport, Weekend at Ashridge, Berkhamsted, Herts. Course on "Problems of Management in Transport."

September 14 (*Sat.*).—Permanent Way Institution, London Section. Joint visit to Dublin with Irish Section members.

September 19 (*Thu.*).—Model Railway Club, at Caxton Hall, Westminster, S.W.1, at 7.45 p.m. Film show arranged by Mr. N. S. Eagles with the co-operation of the British Transport Commission.

September 25 (*Wed.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1, at 5.30 p.m. Delivery of Presidential Address by Mr. E. S. Cox.

September 25 (*Wed.*).—East Indian Railway Officers' annual dinner, at the Connaught Rooms, Great Queen Street, W.C.2, at 6.30 for 7 p.m.

September 26 (*Thu.*).—East Indian Railway re-union tea party for officers and their families, at the St. Ermins Hotel, Caxton Street, S.W.1, from 3.30 to 6 p.m.

OFFICIAL NOTICES

THE NIGERIAN RAILWAY CORPORATION invites applications for the following post:—PRINCIPAL TECHNICAL ASSISTANT—Salary £800 × £50—£1,600 p.a. plus £300 p.a. overseas pay. The duties of the post will be to assist in the Administration of the Chief Engineer's Office, including preparation of officers' duties' rosters, draft indents, departmental instructions and dealing with technical reports. Candidates should be at least 30 years of age and possess an Arts or Engineering degree. They must have had at least 5 years' service in railway administration with experience in programming new works and office organisation. Available on pensionable terms, or on contract with 20 per cent. gratuity per annum of total pay. Tours: 15 months followed by 15 weeks' leave in U.K. on full pay. Allowances: In addition there are attractive allowances.—Apply to: The London Representative, Nigerian Railway Corporation, 11, Manchester Square, London, W.1.

BRITISH RAILWAYS—WESTERN REGION

Applications are invited for vacancies for TECHNICAL ASSISTANTS experienced in designing and detailing steel bridges and structures in the Steelwork Office of the Civil Engineering Department at Paddington, salary range £809/£877.

Travel concessions, holidays with pay and permanency with membership of Superannuation Fund.

Applications stating age, previous experience, etc., to Chief Civil Engineer, B.R. Western Region, Paddington Station, London, W.2.

THE NIGERIAN RAILWAY CORPORATION invites applications for the following posts: (*a*) ACCOUNTANT (PENSIONS FUND). Salary £950 × £50—£1,600 p.a. plus £300 p.a. overseas pay. Qualifications: Candidates must be Chartered, Incorporated or Certified Accountants, and preference will be given to those with experience in the design and operation of Trust Fund accounts. (*b*) ACCOUNTANT. Salary £800 × £50—£1,600 p.a. plus £300 p.a. overseas pay. Qualifications: Candidates should hold a recognised accounting qualification and not less than five years' practical accounting experience since qualifying, or the intermediate examination of a recognised accounting body and ten years' practical accounting experience. Both appointments may be on pensionable terms, or on contract with 20 per cent. gratuity per annum of total pay. Tours: 15 months followed by 15 weeks' leave in U.K. on full pay. Allowances: In addition there are attractive allowances.—Applications to: The London Representative, Nigerian Railway Corporation, 11, Manchester Square, London, W.1.

THE NIGERIAN RAILWAY CORPORATION invites applications for the following posts at the salary of £800 × £50—£1,600 p.a. plus £300 p.a. overseas pay, on pensionable terms, or on contract with 20 per cent. gratuity per annum of total pay: (*a*) MOTIVE POWER OFFICER. Candidates must have served an apprenticeship, graduateship or diploma course or pupilage with a Railway Company or locomotive manufacturers, with subsequent experience on a railway. Candidates should have had extensive experience in both utilisation and repair of locomotives and must have had 5 years' experience in motive power organisations in the locomotive running section of a railway with knowledge of machine and repair shop methods and be capable of controlling staff and labour. Experience in Diesel maintenance and utilisation an advantage. Candidates must posses A.M.I.Mech.E. or A.M.I.E.E. or be graduates thereof. (*b*) PERSONAL ASSISTANT TO THE CHIEF MECHANICAL ENGINEER. Candidates must have served an apprenticeship followed by at least 2 years' organisation and administrative experience in a first-class railway locomotive workshop. They must have had experience of a drawing office and production methods. Carriage and wagon building and maintenance experience desirable. For appointments on pensionable terms age limit 26-45 years and candidates must possess A.M.I.Mech.E. or have passed Parts I and II. For contract terms age limit 55 years and professional qualifications may be waived if compensated by wide experience. Tours: 15 months followed by 15 weeks' leave in U.K. on full pay. Allowances: In addition there are attractive allowances.—The London Representative, Nigerian Railway Corporation, 11, Manchester Square, London, W.1.

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